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ABSTRACT

Twenty-four biographical sketches of women in scientific professions are included in this COMETS Profiles package. Each biography relates to a science topic dealt with in one of the instructional modules of COMETS Science (Career Oriented Modules to Explore Topics in Science). The purpose of these materials is to demonstrate to early adolescents that learning mathematics and science concepts can have payoff in a wide variety of careers and to encourage early adolescent students, especially girls, to consider science-related careers. In addition to the biography, each COMETS Profiles unit contains follow-up language arts activities which have been written directly to students, to facilitate their use in learning centers and independent study formats. However, the materials can also be adapted for use with the total class. Four types of language arts activities are included with each unit: (1) recall/comprehension questions (titled Content Quiz); (2) vocabulary study words (Words to Know); (3) suggestions for research and writing (Ideas for Writing); and (4) topics for creative projects (Ideas for Projects). A test tube symbol in Ideas for Projects indicates activities from COMETS Science particularly appropriate for that COMETS Profiles unit. (Author/JN)

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COMETS Profiles

Career Oriented Modules To Explore Topics In Science

24 Biographical Sketches of Women In Science Careers
Plus Accompanying Language Arts Activities

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COMETS Science, a companion curriculum package, provides 24 sets of lesson plans with over 100 different activities relating science topics and science careers. COMETS Science may supplement this volume or be used on its own. For further information about COMETS Science, contact COMETS, 205 Bailey Hall, Lawrence, Kansas 66045 or call 913/864-4435.

The Trial Edition of COMETS Science may be purchased for $19.95. A sample module costs $1.50; and additional modules (up to 4) cost 95¢ each. Send check or official purchase order made payable to the University of Kansas. Kansas residents add 3.5% sales tax. No requests to be billed can be accepted.

Trial Edition Second Printing

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*Several modules from COMET Science can be used in concert with each COMETS Profiles unit; here one key companion COMET Science module is listed for your immediate reference.

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Various aspects of evaluation took place in over 80 classrooms and involved about 2000 students and dozens of resource people. We greatly appreciate the assistance, critical comments, and suggestions from each of these sources.

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Walter S. Smith

Teacher's Guide

Twenty-four biographical sketches of women in scientific professions are included in this COMETS PROFILES package. Each biography relates to a science topic dealt with in one of the instructional modules of COMETS SCIENCE (Career Oriented Modules to Explore Topics in Science). COMETS SCIENCE and COMETS PROFILES have a twofold purpose: first, demonstrate to early adolescents that learning math and science concepts can have payoff in a wide variety of careers; and second, encourage early adolescent students, especially girls, to consider science-related careers.

In addition to the biography, each COMETS PROFILES unit contains follow-up language arts activities which have been written directly to students, in order to facilitate their use in learning centers and independent study formats. The materials can be easily adapted by teachers for use with the total class, if desired. The biographies and/or activities may be photocopied for classroom use.

Four types of language arts activities are included in each COMETS PROFILES unit: recall and comprehension questions (titled CONTENT QUIZ); words for vocabulary study (WORDS TO KNOW); suggestions for research and writing (IDEAS FOR WRITING); and topics for creative projects (IDEAS FOR PROJECTS). The test tube symbol in IDEAS FOR PROJECTS indicates activities from COMETS SCIENCE particularly appropriate for that COMETS PROFILES unit.

Ideally, the two parts of the COMETS program -- science instructional modules and COMET PROFILES package -- should be used together. However, their format makes them appropriate for separate use as well.

Ruth Noyce, Editor

COMETS PROFILES

COMETS: PROFILE

MARIAN WASHINGTON:
Basketball Coach

COMETS

Career Oriented Modules
to Explore Topics in Science

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Marian Washington

by JoBeth Allen

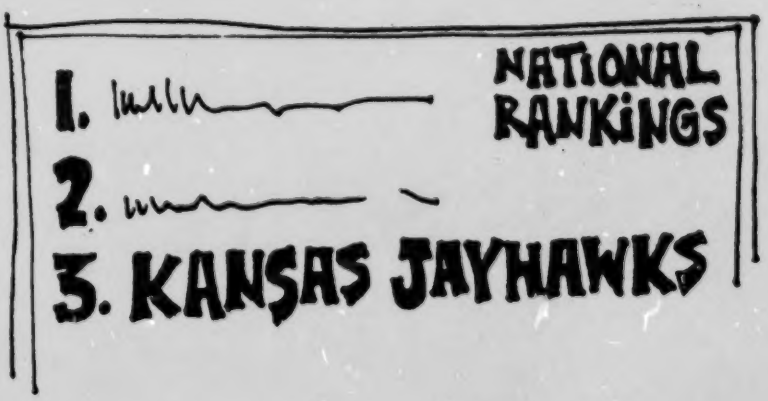
Ann Smith: Great first half, Coach! Your women are really in shape. How do you go about training women to be college basketball players?

Coach Washington: We train differently during different parts of the year, Ann. There are basically three seasons: pre-season, basketball season and post-season. Our pre-season workouts are the most rigorous, because everyone is trying to get in shape. The players run five miles every morning between 6:00 and 7:30. They put in a normal day of classes and studying, and are back on the floor by 3:00. At that time, certain types of athletic training take place, such as whirlpool or heat treatments. The players are on the court by 4:30 and we train until 7:00, so we are putting in thirteen to fourteen hour days, all of us. During the playing season, we try not to get them up so early. Practices will run from about 3:00 until 7:00, with weight practice after that for an hour or so.

Ann Smith: And post-season?

Coach Washington: When we get to post-season playoffs, it really gets difficult. We have to fit practices in where we can, working around finals and an erratic road schedule. We might have two shorter practices rather than the one long one every day.

Ann Smith: You must be doing something right, with a record of twenty and four. Your Kansas Jayhawks are ranked third in the nation, aren't they?



Coach Washington: Yes we are, Ann. In fact, we have been in the Top 20 for the last four years, and we haven't fallen below seventh this season. We are making a good name for ourselves, and now our crowds are growing as a result. Of course we still don't have the audience or the financial support that the men's team generates.

Ann Smith: How does your job compare with that of a men's basketball coach?

Coach Washington: I do everything the men's coach does and more, because I don't have the staff the men do. I have to do all the recruiting myself. I depend on a student or my assistant coach for scouting.

Ann Smith: Does the inequity bother you?

Coach Washington: The extra hours don't bother me, although people often ask how I can keep going at this pace. However, it is terribly draining to be in a position of constantly having to defend myself and the program. We have proven ourselves, but we still have to justify why we exist. I have really struggled to get some of the things I feel the women deserve. I'd rather put that energy into working with the athletes and the people who are interested in and supportive of our program.

Ann Smith: You have quite a reputation as an athlete yourself, Marian. Could you tell us a little about your journey from player to coach?

Coach Washington: Actually, I did both for several years. After high school, I participated in both basketball and track at Chaney State College. I was also a member of an AAU team at that time, and we did a lot of traveling. My debut was in the old Madison Square Garden at the Russian/American indoor meet; I led the nation in the shot put at the time. I began looking around for a school that promoted women's sports, and transferred to Westchester State College. They had an excellent basketball team, so I renewed my interest in that area. It was a good choice; in 1969 we won the first invitational women's basketball tournament.

Ann Smith: Where did you go from there?

Coach Washington: I was asked to try out for the United States national basketball team. For the next six years, I competed internationally in both basketball and team handball.

Ann Smith: Team handball? That doesn't sound like your basic All-American sport.

Coach Washington: It isn't, although it is the leading European sport outside of basketball. It is a very physical game. There are seven players on a team, and the object is to throw a small ball past a goalie into a cage similar to a soccer cage. Our team competed in the 1976 Olympics. I also was a member of two basketball teams that played in world championships, which are equivalent to Olympic games.

Ann Smith: I'll bet you've had some interesting experiences in some of those international games.

Coach Washington: Let me tell you about my first time out of the country. We landed in Mexico and there was a Mexican band there to greet us. We had an incredible record, so I was feeling both confident and excited. The first game was with Chile. Their number one player fouled out of the game, but there was such a ruckus over it that the game was stopped. The Chileans didn't want to continue playing, and the crowd became very hostile. They started throwing coins at us, which really stung our bare arms and legs. Our coach was running up and down the sideline trying to get things straightened out; no one seemed to know what to do. We went to the extreme of

allowing their number one player back in the game, hoping to re-establish order and friendly relationships. They beat us by one point.

Ann Smith: You must have been upset.

Coach Washington: We were devastated. We felt we were the better team. But it proved to be a very valuable experience. Many of the players had gone in as I had, thinking, "I am going to play a great game, I am going to help the team, I...." As we left the floor after that bitter defeat, the crowd was still booing us, shouting, "Chile Number One, U.S. Number Two!" That was when it hit us that they were not booing us as individuals, or even as a particular team. They were booing our country. I grew up at that moment, knowing that I was representing the United States. From that point on, we played with the pride of our country in mind, rather than individual goals.

Ann Smith: Were those the worst conditions under which you played?

Coach Washington: No, there was a similar situation in Colombia, but the physical conditions were much worse. We played on an outdoor court in 45° weather. Our locker was a dugout--literally. It was underground, with dirt walls and floor. Restroom facilities were in the open, so we had to huddle around each other for privacy. College kids came on the court as we were trying to warm up, and began chanting, "Up with Cuba, down with U.S." Once the game started, we found that the media was blinding us with flood lights everytime we went up for a shot. We lost the game, and were cold and miserable. But our national pride spurred us on to win victories the next night over the Chileans and the Columbians.

Ann Smith: How does it feel to be the best in the nation at something?

Coach Washington: There is no feeling like being an international athlete. I think athletics has been a way to achieve recognition for many minorities, especially blacks. For me, it was a way to feel like I was at least at the starting line with everyone else. I was judged by my performance rather than for my clothes or my looks or my father's job. I found very early in athletics an exchange between races that was natural and supportive. There is a caring there, a sensitivity to what another athlete is going through, that is beyond race.

Ann Smith: Your experience has obviously meant a lot to you. How did you feel when the 1980 Summer Olympics were cancelled, even though you weren't directly involved?

Coach Washington: I had a ballplayer who made the team. We spent some time discussing what the possibilities were, and I was pleased with how she handled the situation. She certainly wanted to compete, and I would have been very pleased for her to have had the opportunity. But I had witnessed the slaughter of athletes from Israel on television in 1972. Everyone was stunned. No one who

lived through those awful days could doubt the political potential. The president did have the athletes' safety in mind, in addition to the restraining of the Soviet actions. We decided to support him.

Ann Smith: I'm sure everyone is interested in your career plans. You have had such tremendous success coaching. Do you plan to stay in this position?

Coach Washington: I like coaching a lot, and as long as there is a challenge here, I will stay. However, I have broadened my opinions on what I can do within and beyond that role. When I was growing up, I thought that an athlete was just that, nothing more. My experience as an athlete led me to coaching and administration. A field that has really been beneficial to me as well as interesting is physiology of exercise.

Ann Smith: That sounds very scientific. Could you explain how it relates to athletics?

Coach Washington: Exercise physiology involves learning how to tailor a program in order to get people in the best physical condition possible. It is a field that taught me a great deal about the human body and how it works. People in that area set up conditioning programs, monitor the strength of a person's heart, and figure out the best amount and sequence of exercise to develop a healthy body. Another branch deals specifically with analyzing the movements of athletes. For example, an expert would be able to watch films and determine where a pitcher has her greatest power, what needs to be corrected in a runner's stride, or how a jumpshooter might change her moves slightly for maximum efficiency.

Ann Smith: You mentioned going beyond coaching. Do you have any irons in the fire presently?

Coach Washington: I have become very interested in radio broadcasting. I have done a few commercials, and have my own radio show. I am really enjoying that. I don't have time for many hobbies, but I've dabbled in many interesting activities such as art and music--I used to dance a lot. Of course I'm very interested in staying physically fit. I have even taken some karate.

Ann Smith: Was that your daughter I saw you talking to in the stands?

Coach Washington: Yes. Josie tries to attend as many games as she can. She's a theater major here at the University. Already as a sophomore she's had some pretty good roles in plays at the University

Theater. I love seeing her performances. Acting is something like athletics, so maybe she has learned from me. You have to pick a goal and work at it. Sometimes things don't work out the way you'd like, but you've got to be true to yourself and your dream. If you keep working, you find that dedication pays off in the end.

Speaking of goals, I've got to get back to my team. We're aiming for the Nationals this year!

Ann Smith: I know you have to ge back to the locker room, Coach. Best of luck in the second half and in the rest of the season.

CONTENT QUIZ

It's a close game between YHS and THS (Your High School and Their High School). You are in the fourth quarter and must shoot 90% from the field as well as at the free-throw line. Can you do it?

Field Goals (2 points each)

1. What extra duties does the women's basketball coach have, compared with the men's coach?

2. What is the main difference between pre-season and regular season training?

3. In what two sports besides basketball did Coach Washington excell?

4. Why does Marian say she "grew up" in Mexico?

5. What seems to be the worst part about her job as women's basketball coach, according to Washington?

6. Why did the United States team have trouble shooting in the game in Colombia?

7. Why did Washington support the boycott of the 1980 Summer Olympics?

8. Why has exercise physiology interested Coach Washington?

9. What is Coach Washington's newest career interest?

10. How does Marian feel athletics can be an equalizer for minorities?

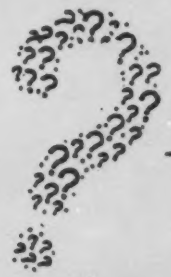
Free Throws (1 point each)

1. What was the team win-loss record at half-time?

2. Where is team handball widely played?

3. What is the interviewer's name? TECHNICAL FOUL AGAINST THS: If you can answer the last question, you get a free point. WHAT IS THE NAME OF THE TEAM MARIAN WASHINGTON COACHES?

Final buzzer! THS has made 19 points this quarter, making their total 59 points for the game. You had 40 points going into the last quarter. If you made your goal of 90% accuracy, you beat them! Figure your score, and then report to the showers.



ANSWERS TO CONTENT QUIZ

Field Goals

1. Recruiting
2. The players are not required to do the early morning running.
3. Field events (shot put and discus) and team handball
4. She learned to play as a representative of her country, rather than for personal glory.
5. Having to defend and justify the women's basketball program.
6. The media shined flood lights in their eyes every time they tried to shoot.
7. She recognized the potential danger to athletes because of the 1972 massacre of Israeli athletes.
8. She learned a great deal about how the human body functions, and is interested in applying exercise physiology to improving an athlete's skills.
9. Radio broadcasting
10. Athletes are judged on performance rather than on more subjective criteria.

Free Throws

1. 20 and 4
2. Europe
3. Ann Smith

Technical - Kansas Jayhawks

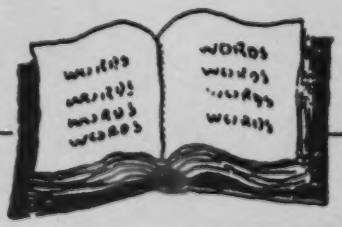
WORDS TO KNOW

Each sport has its own terminology. In many instances, the words are not invented for or from the sport, but are used in a different way. Most of the terms used in basketball have other, more common meanings. Define each of the terms below as it applies to basketball.

center
defense
dribble
fast break
field goal
foul
free throw
guard
lay-up
offense
overtime
pass
pivot
press
rebound
technical
traveling
turnover
zone

Besides the standard terminology, most sports also have a slang that develops over the years. These will be more difficult to define, because they probably won't be in a dictionary or encyclopedia. Coaches and avid fans would probably be good resources.

air ball
bunny
cherry picking
draw iron
facing (in your face)
garbage basket
hot dog
hustle slippers
rainbow
riding the boards
setting a pick
sky hook
slam dunk
swish



IDEAS FOR WRITING

1. Invite the sports editor of your local newspaper to speak to your class. Formulate questions before her or his talk. Some things you will want to learn about, related to projects in this section, are interviewing techniques, covering a sports event, writing the story from an interview and from live coverage, writing a catchy headline and layout techniques.

   Work together to produce a special all-sports edition of a newspaper. Some of the following tasks can be done by an individual; others would be easier with two or three people working together.

   a. Interview a well-known local athlete. This could be a high school or college man or woman, a professional, a retired athlete or someone from your own school. Several students should choose this activity to get a variety of interviews. Write up the interview using the guidelines given by the sports editor.

   b. Cover a local sports event. Write a news story from your notes.

   c. Write an editorial about some sports topic, such as:
      1) salaries of professional athletes
      2) changes in girls' and boys' sports in your school
      3) need for _____ (additional sport) in your school
      4) the image of the athlete

   d. Use some national sports stories in your paper, but arrange them under different categories. For example, you might want to have sections on "Off-season Sports", "Sports for Your Health", "Sports Around the World", or "Sport Scandals".

   e. Writing interesting headlines is an art that is especially applicable to sports reporting. Have one or two people in charge of writing all the headlines for the stories in your special edition.

   f. Now put it all together--not an easy task! The information you gained from the sports editor should be helpful. If you have access to a copying machine, you may be able to make copies for the whole class and others.

2. Write a paper about how political movements have affected the Olympics. Cover the historical instances of political involvement, and then take a stance on whether or not the Olympics should be beyond political intervention.

3. Choose your strongest athletic interest and/or ability and explore career options within that field. Write a "help wanted" ad for each option, including qualifications, duties and benefits.

IDEAS FOR PROJECTS

(Some of the following activities are adapted from Change for Children, Kaplan, Kaplan, Madsen and Gould, Goodyear Publishing Company, 1980).

1. Sticks & Stones. Place several objects that could be used for a game in a box. Each person who chooses this activity can choose two things from the box. The object is to make up an original game using the two items selected, complete with number of players, rules of the game, playing area and object of the game. Some objects that might be placed in the box are sticks, cans, ropes, balls, rocks, hoops, chalk, blindfold, marbles, and net.

2. Faces in the Crowd. Create a collage of faces showing the "thrill of victory" on one side and the "agony of defeat" on the other.

3. Full Court Sketch. Draw to scale or create three dimensionally a basketball court. Use the following information:

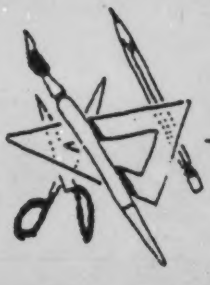
   The courts for most high school games measure 84 feet long and 50 feet wide. The center circle is 4 feet in diameter; the restraining circle is 12 feet in diameter. The free throw lanes measure 12 feet wide and end in a half-circle that has a 12 foot diameter. The free throw line is 19 feet from the end of the court.

   The basket rim is 5/8 inch thick and 18 inches in diameter. The net hangs down 15-18 inches. The backboard for high school is fan shaped and measures 54 inches wide and 35 inches high at the widest and highest points. The backboard must be mounted so that it is 4 feet inside the end line. The basket is attached to the backboard near the bottom, with the top of the ring parallel to the floor and 10 feet above it.

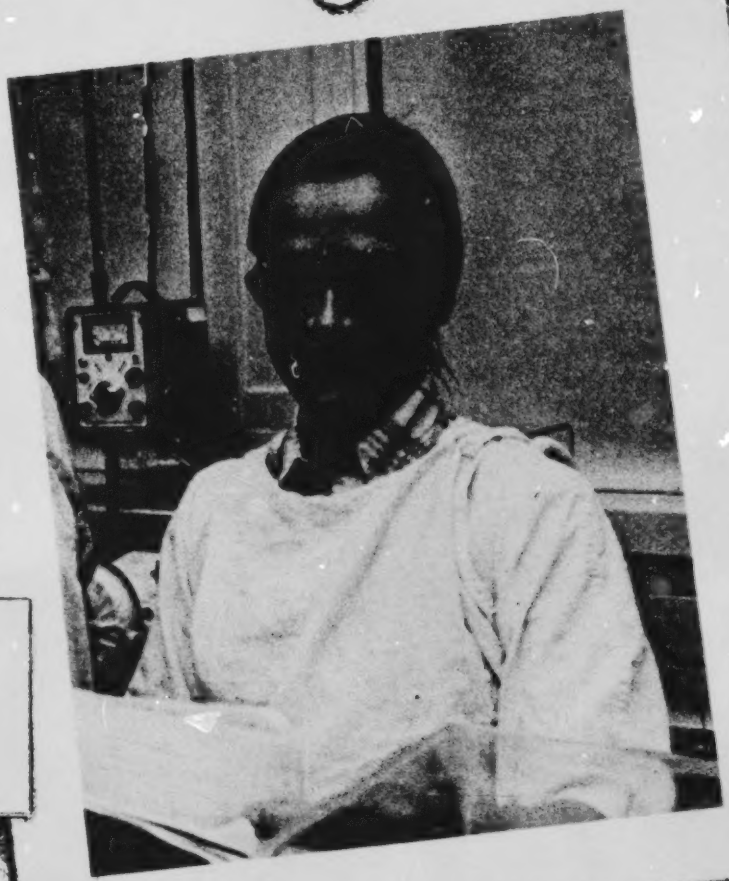
4. Hall of Records. Assemble nine shallow boxes on their sides to represent rooms in a house (you could put a roof on this or otherwise embellish it to create more of a building effect). Label each room according to some sport; for example, you might have "Winner's Circle" (horse racing or auto racing), "Football Huddle", "Boxing Corner", and "Dugout". Members of the class contribute various bits of information in different categories either by researching one sport, or by choosing one area and supplying information for all sports. Possible information categories include "Famous Firsts", "Women's Records", "Longest Distances", "Most Times", and "Moments of Infamy".

5. An Eventful Day. Organize a competition in your class or school. Pick an unusual or currently popular sport that is not usually thought of as competitive. You might include roller skating, skate board riding, pogo jumping, Monopoly, or discoing. Devise appropriate events and prizes.

Look at COMETS Science's Bones and Balance for activities which show how physical laws apply to our bodies' operations.



COMETS: PROFILE



VAL VISSER:
Neonatologist

COMETS

Career Oriented Modules
to Explore Topics in Science

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Valya Visser

by Ruth Noyce

Life and death decisions are made regularly by pediatricians who work with sick newborn babies. It takes a special breed of doctor to handle the crises constantly arising in this demanding aspect of pediatric medicine -- neonatology.

You can usually find neonatologist Valya Visser in the special nursery of a large medical center with about a dozen babies who are very small or very ill. In certain ways, this area is unlike the regular hospital nursery where babies are cared for after birth for a few days. Two or three babies who weigh only a few pounds and are too small to go home can be seen in the convalescing section. Most of the babies have been brought to Val's nursery from a large region surrounding the medical center, because smaller hospitals are not equipped to provide treatment for sick miniature babies. When babies are born elsewhere and need special care, they are transported to this "tertiary care" nursery. "Tertiary care" refers to treatment at the third level, meaning that the baby cannot be properly cared for either by its parents or by normal nursery services.

"Ordinarily, when people are sick, they get in their cars and drive to the doctor, or, if they are very ill, someone will call an ambulance to bring them to the hospital. But for a newborn, even the ambulance personnel don't have the training needed to give that baby the necessary care," Val points out. Rather than risk the delivery of babies who develop hypoglycemia, dehydration, or breathing problems during transport, one of Val's fellow pediatricians has designed a special ambulance for newborns. They have named it the Jaystork, which is an adaptation of the name of the symbolic bird mascot (Jayhawk) of the university to which the medical center is attached.

The Jaystork is a recreational vehicle which has been gutted out and redone on the inside to contain all the equipment that is available in the intensive care unit of a hospital. There is even an x-ray machine, as well as a respirator for babies who are not breathing well. "Now the babies don't have periods of stress from making the trip, before arriving here," observes Val. "Of course,

if the trip is going to be longer than about two and a half hours, we use a helicopter or plane. The time element is just too risky." She goes on to explain that, since neonatology is a new speciality, there are many towns without a physician who is trained in it. "Fortunately, they know that we're here. They'll call us and we'll come and get the babies."

During the months when she is in charge of the nursery, Val generally starts her day about seven-thirty with paperwork (over a cup of coffee), preparing discharge summaries for the doctors of children who are going home. She spends most of the morning making her rounds, seeing patients and their parents, and sometimes calling hometown doctors to tell them how their babies are doing. She also confers regularly each morning with the other staff doctors about patients and problems. "We work as a team. We all deal with all the patients," she continues, "so we sit down and talk together."

A neonatologist's afternoons are usually spent in research and teaching, with most teaching taking place in conferences with resident physicians about particular problems. Val, like most of her fellow specialists, spends some time doing laboratory research, hoping to solve problems important to the body of medical knowledge. Very little of her time is spent in classroom teaching, because most courses medical students take before they specialize are in fields like physiology and biochemistry. She works with them in small groups when they are assigned to patient care services in pediatrics, during the latter part of their coursework. According to Val, if it is her turn to be the attending doctor in the well-baby nursery, she works with the medical students assigned there. "We have discussions and I teach them how to examine the patients. Occasionally, I get called into the basic science courses to give something to beef them up, but most teaching I do is on a patient care basis with small groups. In my specialty, I often do one-to-one teaching on procedures -- how to do a spinal tap on a premature baby, for instance. That's a whole special skill." The other kind of teaching Val does is in short post-graduate courses for updating practicing pediatricians. Rather than trying to read all the literature for themselves, many doctors in general pediatrics prefer to listen to Val's lectures about new developments in neonatology.

After an afternoon of teaching, Val goes back to the nursery about five o'clock, if she is on call. She checks the patients and talks with the resident doctors who will be on duty all night. When she leaves the hospital, she knows that she may be asked to return at any time during the night, particularly if a new baby arrives. "I spend some late hours in here," she reflects, "sometimes as late as two or three in the morning. If I'm not on call, though, I usually go home about six o'clock and forget about the place."

When it is Val's turn to be the attending physician in the nursery, she works seven days a week. "Babies don't know that we're supposed to take Saturday off," she says. At other times, she is on duty every third weekend, taking turns with the other two neonatologists on the hospital staff.

At age 32, Val reflects now and then about past experiences which have played a part in the development of her medical career. She recalls that she has always been interested in biology and ecology. "I remember doing a science project in the eighth grade with different kinds of chemicals and I also recollect being very involved in nature study at camp. There was no particular push toward science in my family (my mother was a social worker and my dad is an accountant), but I was given a great deal of encouragement to do what I wanted to do and to always shoot for the top of the line. As I grew older, I looked at what was really a usable career and went to medicine. Of course, there is also a big demand for forest rangers!"

Part of Val's attraction to medicine is humanistic. In her opinion, it is not just a scientific profession. She remembers being asked by the Dean of an undergraduate school to which she had applied: "Why do you want to go to medical school?" She answered that she liked the scientific disciplines but also was attracted by the idea of service in medicine. He expressed displeasure with her attitude, commenting that people who wanted to help others should be ministers or something like that, and that scientists should go to medical school. "Fortunately," laughs Val, "the medical school accepted me anyway. I do think there is a humanistic side to medicine that does not exist in science. Some of us may get a little too involved sometimes, but most physicians continually try to maintain a good sound posture. At any rate, medicine is a puzzle that never gets boring. It is always fascinating because no two patients are ever the same."

Val advises students who are interested in medical careers to make good grades from the day they start college, emphasizing that entrance to medical school is based primarily on scholastic records. While it is possible in some fields for people to coast for a year or two in college, as long as they straighten up toward the end, students who seek medical careers cannot afford that, because entry requirements are too difficult. She also urges students to pay attention to human relationships along the way: "When you're in your third year of medical school, you feel like you'll never get out. Your friends are all out of college, writing you letters about their jobs and their children. It finally becomes one of the most rewarding things you can imagine, but requires an interest in some of the central aspects of life, not only science. I'm glad that somebody studies the moon in its orbit, but for me it is satisfying to take my long education and apply it to human situations that really matter."

Her credentials as a certified neonatologist equip Val to wear two hats on the medical center staff. She is both a professor in the medical school, teaching medical students and residents, and a practicing pediatric specialist, taking care of patients. While doctors in her position are more scientists than practicing physicians, she maintains that a good memory is more important than an understanding of nuclear physics. The physiologists and pharmacologists at the medical center are the basic researchers, for the most part. In describing what she does, Val draws

an analogy with private industry: "It's the difference between the guy in industry who gives out the new process and the guy who takes the new process and applies it so it can be mass produced. Most of us are in that second line. A lot of physicians do some basic research, but what we do best, really, is take care of patients. And that requires, more than anything else, being able to remember everything or at least being able to remember where to find it. Then you can apply it."

What educational background does a neonatologist have? A bachelor's degree in any field will suffice for entry into medical school, as long as the required science courses are taken. There are no choices of courses during the first two years of medical school, but after that you begin to mix in the practical aspects of working with patients. The law requires that you serve as an intern for one year after your medical degree is granted, before you can legally practice. Most people do a three-year residency in some specialty after that. Then the majority of doctors go into practice. Some, like Val, work further in a special area and remain in the referral medical centers to treat difficult patients. A neonatologist is, in other words, a pediatrician with special training in the care of newborns.

Neonatology is a new field of specialization. Only a few years ago, doctors lacked the physical technology to treat tiny babies. For example, they were not able to start an I.V. (intravenous feeding) on a premature baby because there was no I.V. equipment small enough. "To put an intravenous line in a baby whose blood vessels are a millimeter across requires very small needles and a lot of patience in order to get the needle into the vein," explains Val. "Now we have equipment that will perform with pindrops of blood rather than milliliters. In caring for babies it is important not to draw so much blood that they need a transfusion, which may have germs in it. If you went in for a blood test, we would draw out five cc's of blood, but we draw only ten drops from a baby. We can't afford to take five cc's of blood from a baby who is three months premature because that is five percent of its total blood volume. It's a whole new technology."

"The old idea of living in an incubator is still with us," Val continues. "Small pre-term babies aren't able to regulate their temperature, so they are placed in a plastic-walled, completely enclosed area where we can control both temperature and humidity. It doesn't look like the old incubator in the movies, though. We also have respirators that will deliver as little as a teaspoon of air to those tiny babies."

The vast majority of babies which survive in Val's nursery are three months premature or less, but she sees many babies with gestation times of twenty-eight weeks that survive. There is a chance of survival if they are younger, but not a very good one. "We keep trying!" she remarks. "Five years ago we said thrity-two weeks was the minimum age for survival, so we're getting better. When you become accustomed to working with these babies, you realize how tough they really are. They aren't as fragile as they look."

Val's husband is also a physician, so her "turned around-bumbled up" lifestyle is not a problem at home. He understands, because his life as a resident in surgery is the same way. She hints that they have nobody to blame but themselves for their unusual home life. "You know, you can be a dermatologist. They almost never get called out in the middle of the night. There are different kinds of medicine and different kinds of lives. A neonatologist and a surgeon lead a crazy life, but we're attracted to our specialties because we enjoy them!"

CONTENT QUIZ

1. How does a neonatologist's role differ from that of a physician who practices general pediatric medicine?

2. What does "tertiary care" mean?

3. Why is a special ambulance needed for newborns?

4. What does a neonatologist do besides treat newborns in the nursery?

5. What kinds of teaching does Val do?

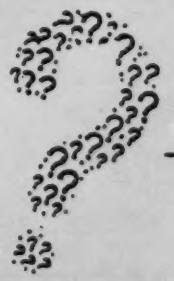
6. What advice does Val give students who are interested in medical careers?

7. What educational background must a neonatologist have?

8. What recent developments have taken place in this new technology?

9. Why is it important to avoid transfusions in newborns?

10. What is the medical specialty of Val's husband?



ANSWERS TO CONTENT QUIZ

1. A neonatologist specializes in treating newborn babies.

2. Third level treatment, beyond what a baby's parents or normal nursery services can offer

3. Ambulance personnel need special training and equipment to handle newborns.

4. Neonatologists usually conduct research and teach, in addition to caring for patients.

5. Val works with small groups of medical students on a patient care basis, teaches procedures one-to-one, teaches basic science courses, and offers post-graduate courses to update practicing pediatricians.

6. Make good grades in college and pay attention to human relationships along the way

7. A bachelor's degree with basic science courses, a medical degree with internship, and a three-year residency in the specialty

8. Intravenous feeding equipment for newborns, enclosed incubation areas, and special respirators

9. The blood may contain germs

10. Surgery

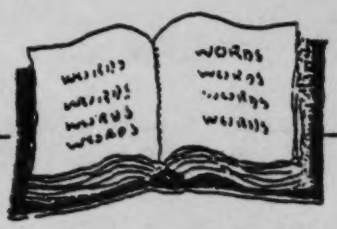
WORDS TO KNOW

NEONATOLOGY means "the study of newborn babies."

Use a dictionary, when necessary, to unlock the meanings of these "-ology" words:

The study of:

paleontology	----------	chronology	----------
dermatology	----------	endocrinology	----------
cardiology	----------	zoology	----------
cosmetology	----------	phrenology	----------
criminology	----------	ethology	----------
anthropology	----------	ornithology	----------
pathology	----------	pharmacology	----------
physiology	----------	parapsychology	----------
biology	----------	immunology	----------
ecology	----------	philology	----------
physiology	----------	archaeology	----------
sociology	----------	graphology	----------
hematology	----------	kinesiology	----------
technology	----------	ichthyology	----------
geneology	----------	geology	----------
astrology	----------	etymology	----------



IDEAS FOR WRITING

Paragraphs:

1. Write a paragraph discussing the term "humanistic" and explaining what it means to you.

2. Describe another profession which is as humanistic as the field of medicine, in your opinion.

3. Find out about the emergency medical services available to accident victims in your community, and write directions for people to follow in obtaining those services.

4. Explain Val's statement, "A good memory is more important (to a neonatologist) than an understanding of nuclear physics."

5. Think about your own interests. What "usable" careers are related to those interests? Write a paragraph about one of those careers.

Themes:

1. Research the history of one of the procedures or inventions listed below and write a detailed account of the major technological changes that have taken place in its development:

   Incubator
   Intravenous Feeding
   Respirator
   X-Ray Machine
   Spinal Tap
   Transfusion

2. Imagine that you are a neonatologist in a large medical center. Write a journal or diary covering one week in your life.

IDEAS FOR PROJECTS

1. Design the outside of the Jaystork as you think it should look. Then sketch the floor plan of the inside as you visualize it.

2. List as many medical specialties as you can find under the heading "Physicians" in the yellow pages of a telephone directory. Find out as much as you can about each specialty and prepare a "Medical Careers" packet, for the purpose of sharing that information with others.

3. Val suggests that some people who are interested in biology and ecology might wish to become forest rangers. Search out information on other careers related to these two fields. Design a career chart which lists and describes these occupations.

4. Set up an experiment to compare these amounts of liquid in test tubes: a drop, one milliliter, one cc, a pinpoint, ten drops, five cc's, one fluid ounce. Design a bar graph to demonstrate the results of your study and present your conclusions.

5. Select one or more of these books and read about women physicians with specialties other than neonatology:

   Elizabeth Blackwell by Jean Latham (Garrard, 1975)

   Elizabeth Garret, M.D. by Jo Manton (Abelard, 1960)

   Look to This Day: The Lively Education of a Great Woman Doctor, Connie Guion, M.D. by Nardi Campion and Rosamond Stanton (Little, 1965)

   Physician to the World: Esther Pohl Lovejoy by Olive W. Burt (Messner, 1973)

   Alice Hamilton: Pioneer Doctor in Industrial Medicine by Madeline Grant (Abelard-Schuman, 1967)

   Woman Doctor of the West: Bethenia Owens-Adair by Helen Miller (Messner, 1960)

   The Cancer Lady: Maud Slye and Her Heredity Studies by Joseph J. McCoy (Nelson, 1977)

Read in COMETS Science's Fit N' Trim about how to gauge your own physical fitness and ask an obstetrician, pediatrician, or other health worker familiar with newborns to talk with students about the APGAR Test, which measures the newborn's fitness.

COMETS: PROFILE

MARCIA TURNER:
Architectural Engineer

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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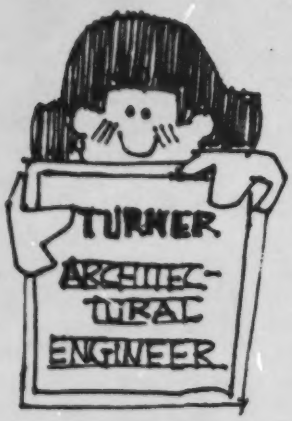
Marcia Turner

by Ruth Noyce

You can count as many as sixty of Ma Bell's huge telephone towers as you travel across one American state. Although they seldom improve the land aesthetically, they keep the noise off our telephone lines by getting the long distance calls up in the air, where cables are not subject to cutting by contractors. These mammoth metallic monuments are the creations of telephone company specialists who are continually solving problems by modernizing equipment. Coordinating their construction is a major project which requires architectural and engineering skills. Telephone company project architect Marcia Turner has both.



The building of towers is only one among a variety of projects which Marcia supervises as a manager of the telephone company's modernization program in her state. In this very specialized practice of architecture, her role is quite different from that of the typical architect, for she is involved more in coordinating and planning than in drafting and designing. She explains that "architecture, as practiced in a large corporation, necessarily involves a lot of paperwork, and that's not my favorite part. Designing is fun, and I don't have time to do the design work I would like to do, but I also enjoy the legal aspects of my work, making sure others who are bound by contracts carry through according to specifications."

One of Marcia's primary functions as a project architect for Southwestern Bell in her state is to translate information from telephone user groups into architectural terms and develop programs to meet their needs. Sometimes this involves the construction of a large building or the remodeling of an existing building. At other times, it means simply moving a wall to make room for equipment or office space. While a small alteration of this kind is usually designed by architects such as Marcia, large building additions are often done by outside architects.

"If a project is a large one, requiring a building addition or new building, we will generally go to the location and get a local consulting architect and engineer to design it," says Marcia. "It's easier for local firms to take the responsibility for the design because they are sensitive to the community and the economy. They are also more familiar with the building codes in a particular location than we are. We allow them to practice the design portion of architecture for us."

After building plans are completed by consulting architects, they are sent back to Marcia, who invites local contractors to bid on the projects. Her office handles the payment of the contractors and the provision of construction observers to supervise their work. According to Marcia, "Our consulting architects are most familiar with what they want and how they want it to work, so they review the shop drawings and

do fifty to sixty percent of the basic services. Our construction observers are our eyes in the field, because we can't physically be all over the state with all of our projects."

"We depend on many outside people," she continues. "Salesman are specialists who know about their projects. Listening to them is a large part of my job, for this is how I find out exactly what their products can do. Take paint, for example. The paint salesman know about the standards of the paint industry, and they can tell us, for instance, when to specify the use of paint without lead in it, to avoid health concerns. After hearing product descriptions from several salesmen, we are also able to ask smarter questions. We couldn't store all that information in our heads if we went to college until we were eighty years old!"

Marcia believes that there are some practical basic skills needed in her work which should be taught in school, such as the verbal skills required for communicating clearly with people and the writing skills needed to prepare specifications and contracts. "It is very important for you to say exactly what you want, because quite often everyone else associated with a project is concerned more about money than about the design. The architect is going to have to balance these two for the client. In four or five years of college classes, you learn how to design, but you don't learn the practical things until you are an apprentice," she comments.

She quickly attributes her "system analysis" approach to problem solving to her School of Architecture program. This is where she learned to order pieces of information logically before trying to process them. As a result of this training, she now tries to consider each project as a whole system, identifying the interdependent subsystems and relating them to each other. Marcia admits that there is one drawback to her commitment to systems analysis, though -- sometimes she loses her patience when other people don't approach problems in a logical, systematic way.

Because of her strong mathematics background, Marcia enrolled in an architectural engineering program in college, which differs from the regular architecture curriculum in that elective courses are taken from the engineering sciences rather than from the liberal arts, like psychology and humanities. Courses in building structure are taken to build an appreciation for how structural engineering affects an architect's design. "Most students come into the School of Architecture with a strong artistic background, either in drawing or painting," observes Marcia. "I came in from the other extreme, having a strong math and science background. Some courses were difficult. It was sometimes

almost painful trying to draw things, although I could picture them in my mind. When we did perspectives, if I could plot the points on a cube, I could then figure out mathematically where that point in space was and draw a line between the two points. But freehand sketching was very difficult for me."

"I think many students go into architecture just to be professional designers," she goes on, "and there's a lot more to the actual practice than that. And there are environmental problems to be solved, so that clients can carry on their function in some kind of habitat or space. The financing of the job must also be considered.

Marcia recollects that her parents, both of whom are accountants, influenced her pursuit of a science career by stimulating her interest in mathematics, as well as offering their support and encouragement in whatever she chose to do. "I was the oldest of three children spanning twelve years," she adds. "Being 'an only child' for the first seven years had some definite advantages. I can remember my parents asking me when I was only about three years old how many apples I would have if Daddy gave me two and Mother gave me one. I came into a math background at a rather young age, and became a math major later."

This is Marcia's first job, and she is convinced that working for the telephone company is an excellent way to get the initial experience needed to go into the private practice of architecture. In her opinion, many young architects in a firm don't have any idea how much money the firm is getting for a project. On the other hand, Marcia knows what is happening across the whole project, from beginning to end. She is the one who negotiates with a consulting firm and it gives her a good picture of what really goes on. It is also an excellent career choice for architects who don't want to go into private practice.

A typical day starts at 5:30 for Marcia and her husband, Ken, who is also a Bell engineer. Trent, their three-year-old son, is dropped by the baby-sitter's about seven-thirty. They drive to work together, unless it is a day when their schedules are not concurrent, making two cars necessary. Child care duties and household tasks are shared by the couple, and the evening hours are almost completely dedicated to doing things with Trent. They have a few hours to themselves after eight, when he is in bed. On weekends, they usually find time for a bit of socialization.

"Being engineers, we kind of planned this out," says Marcia. "The deal we made to begin with was that we both wanted to have careers, we both wanted to maintain a house, and we both wanted time to spend with our child. We wanted him to grow up according to some ideas we have, and we knew that

one person couldn't do all that. So, from the very beginning, Ken has helped change diapers, do the feedings, and spend time with Trent. Quite often, in the evenings we'll walk around the block together, stopping to talk with the neighbors. On weekends, we usually plan some activity geared to his level, trying to spend most of his waking hours with him."

Because she and Ken plan to have more children, Marcia is keeping her professional options open by establishing contacts through civic and professional organizations. She is also broadening her background by finishing a a Master's degree in architectual engineering, preparing herself to teach engineering courses or to enter private practice. She advises girls who are planning a career and a family to investigate the choices that are going to be available to them by talking early with people who are in the careers they are considering.

In math and science related fields, particularly, the state of the art is such that these things need to be carefully considered. Because engineering is so technical, it is difficult to drop out of or engage in on a part-time basis. If you don't keep up with the changes in the field, you might find yourself in trouble. However, certain kinds of engineering careers offer opportunities for consulting on a part-time basis. Architecture careers can also be arranged part-time, usually in blocks of time devoted to one project.

Marcia recommends the field of architecture, as well as the related areas of landscape architecture and interior design, for women. In her opinion, all are creative careers from which a great deal of satisfaction can be derived.

"The hardest part about being a woman in this non-traditional career," she says, "is that generally the male architects have worked in construction, and so they have a better feel for what is actually going on in the field. But I have been quite happy as an architectural engineer. It supplies adequate money for what I do, and I have fun doing it!"

CONTENT QUIZ

1. How does Marcia Turner's practice of architecture differ from that of most architects?

2. How large is the territory Marcia serves as project architect for the telephone company?

3. List the kinds of outside people Marcia depends on in her work.

4. What basic communication skills does Marcia consider essential in her profession?

5. In what way does the architectural engineering curriculum differ from the regular architecture curriculum in college?

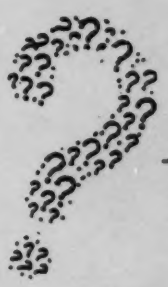
6. What were the strongest subject areas in Marcia's background?

7. How did Marcia's parents influence her career?

8. What other jobs has Marcia had?

9. Why does she consider her job excellent preparation for private practice in architecture?

10. What is Marcia's advice to girls who plan to combine a career and a family?



ANSWERS TO CONTENT QUIZ

1. She does more coordinating and planning than drafting and designing.

2. An entire state

3. Local consulting architects; contractors; salesmen

4. Verbal skills for communicating clearly and writing skills for preparing specifications and contracts

5. Elective courses are taken in the engineering sciences rather than the liberal arts.

6. Math and science

7. By encouraging her interests in math and supporting her in whatever she did

8. This is her first job.

9. She deals with the financial aspects of projects.

10. Explore the options available to you in the career you are choosing.

WORDS TO KNOW

You can see many examples of new words entering our language by scanning the yellow pages of a telephone directory. One of the most common word-making processes involves finding new uses for existing prefixes and suffixes. For example, the suffix -rama (implying "largeness") has been used to create names for inventions or products such as Cinerama, Slenderama, Beautyrama, Coolerama.

The prefix tele- and the suffix -phone are frequently used in this way to name new inventions. Explore the yellow pages of a telephone directory, using these guide words: TELEPHONE AUTOMATIC ANSWERING EQUIPMENT; TELEPHONE ANSWERING SERVICE: TELEPHONE EQUIPMENT and SYSTEMS: TELEVISION. List below all the new words you can find in these sections of the yellow pages to illustrate this word-making process:

1. Tele- (Telex, Teletypewriter)

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2. -phone (Maxiphone; Code-a-phone)

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3. Ans- (Ansaring; An-tel)

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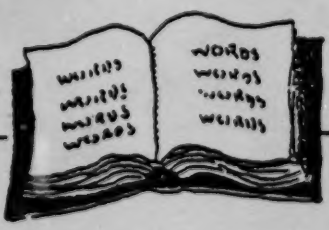


IDEAS FOR WRITING

Paragraphs

1. If you could make a free long distance call, (1) Who would you call? (2) Why? (3) What would you say? Answer these questions in a paragraph.

2. What improvements would you like to see made in the design of telephones? Describe the ideal telephone you visualize.

3. Explain briefly what influence, if any, your parents have had in the development of your interest in a favorite subject.

4. How do you think the telephone company came to be nicknamed "Ma Bell"? Write an explanatory paragraph.

5. Write clear and concise directions for someone to follow in order to make each of these telephone calls: (1) direct dial a Chicago friend, whose number is not known, (2) obtain a phone number which is not listed in the directory; and (3) report a mechanical problem with a telephone.

Themes

1. Research one of these styles of architecture and write a detailed account of it, including its origin, history, and description: Gothic, Byzantine, Romanesque, Greek, Victorian, Colonial, Contemporary.

2. Investigate three of the architectural styles listed above, and write a paper describing and comparing their characteristics.

3. Find out all you can about one of these famous architects and write a biographical sketch, including a description of the architect's style: Frank Lloyd Wright, Louis Sullivan, Mies van der Rohe.

4. Try to find a book FROM IDEA INTO HOUSE by Rolf Myller (Atheneum Publishers, 1974) in your school or public library. After reading it, write an expanation of house construction from an architect's point of view.

IDEAS FOR PROJECTS

1. If the telephone company gave you a discarded, empty telephone booth, how might you put it to use? Design and sketch your plan.

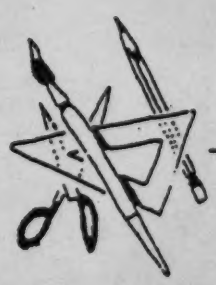
2. Investigate telephone company careers, and make a chart listing the various jobs available, describing each briefly.

3. Sketch an example of each of these architectural styles: Greek, Romanesque, Gothic, Byzantine, Victorian, Colonial, Contemporary. Display your sketches on a bulletin board, labeling each style, or make an overhead transparency of each drawing to use in describing the various styles to others.

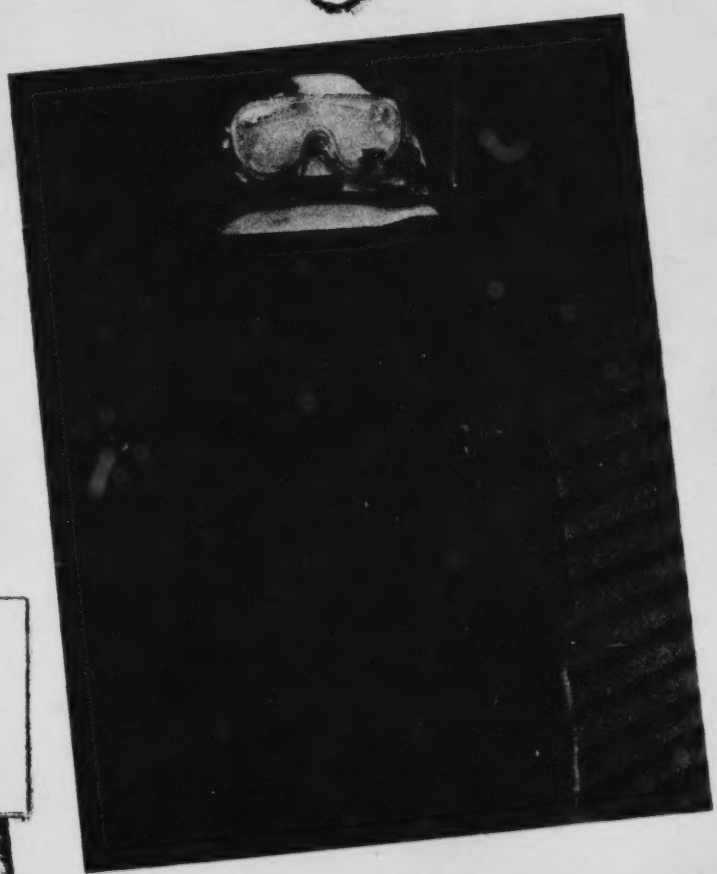
3. Browse in your school library to search out some of these books by architect David Macauley: CASTLE (1977); CATHEDRAL, THE STORY OF ITS CONSTRUCTION (1973); CITY, A STORY OF ROMAN PLANNING AND CONSTRUCTION (1974); PYRAMID (1975); UNDERGROUND (1976). Publisher: Houghton Mifflin. Select your favorite book and prepare an oral presentation to share Macauley's drawings with others.

5. Take a walking tour of an old section of your city and either sketch or photograph some of the interesting homes you see. Make your own sketchbook or photo album, identifying each style of architecture you have included.

Give students a box of straws and straight pins. Challenge them to build an 18" long bridge between two tables, using no other materials. See whose bridge can hold the most weight. Ask an architect, civil engineer, or builder to come to your class to talk about physical concepts used in their careers. See COMETS Science's Constructions for additional directions. While you're there, read about the work of Julia Morgan as architect for William Randolph Hearst's palatial mansion, San Simeon.



COMETS: PROFILE



MARYLEE SOUTHARD:
Chemical Engineer

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Marylee Southard

by Jane Lucas

If you like thinking big and you find working math problems fairly easy, chemical engineering may be the field for you. It is for Marylee Southard, a petite young woman, who considered a career in music before she enrolled in chemical engineering at her state's largest university. Despite the urging of some people that such a course was not for women, Marylee felt that she knew better than anyone else what she wanted to do with her life, and she has done it.

For four years Marylee Southard has been the only female out of ten engineers at a plant that makes products for the food and detergent industries. At times she has donned a hard hat and goggles to climb ladders and wield a crescent wrench alongside men twenty to thirty years her senior. At other times she has hung up her powder-caked coveralls and put away her steel toed shoes to return to her desk. There, surrounded by blueprints, file drawers, a calculator, ruler, and pencils, she has worked on the development of a new product.

The dynamic quality of her job is what particularly excites Marylee. "One of the good things about being an engineer is the variety of things to do," she points out. "It's very challenging." She goes on to credit her family and a teacher with influencing her toward a scientific profession.

When Marylee was a youngster, she accompanied her father, who teaches engineering subjects at a public university, to his office. There she played with his gadgets and watched him at work on various projects. He encouraged her interest by asking questions: "How does it work"? "Why does this happen the way it does"? Marylee notes that people often ask boys such questions, assuming that they want to see how something works, but that people rarely ask girls such things.

Her family's unique approach to encouraging their girls to think - not just to follow directions - allowed Marylee not to be inhibited by any prior feelings associated with a particular occupation or interest. She never felt, for instance, that it was unusual for her, a girl, to like geometry or to want to tear an engine apart.

Almost as important as Marylee's family in supporting her interests was her ninth-grade science teacher. Marylee remembers how enthusiastic this woman was about chemistry, geology, and physics. "She challenged

the students, made us think. We always wanted to know more," Marylee recalls.

Though Marylee's small town elementary school background was only average, her junior high and high school years were generally good grooming for college. Students were allowed to work at their level and to progress at their own speed. Marylee studied as much math and science as possible and continued this program during her four years of college.

"A chemical engineer is an applied chemist in a way," Marylee explains. "You end up taking a lot of chemistry in college - as much as a person with a chemical degree does - as well as math and physics, an intensive engineering program."

To define her field still further Marylee makes this distinction: "A chemical engineer is like a chemist except on a big scale. Chemists have test tubes in which they put two substances to produce a third substance. They try to create something useful. Chemical engineers, on the other hand, work with thousands of pounds of things, hundreds of gallons of things, to make a product in very large quantities to be used by many people."

The product that Marylee and her co-workers have been developing for the past three years is a special preservative. It would keep food to be shipped abroad, like Kool-Aid and Cream of Wheat, fresh and appetizing looking even after it has been sitting on a shelf for weeks.

Another use for this product is in grain shipments to indigent countries. The product inhibits bacteria growth. Therefore, the grain will not contain larvae or insects if this product is used in it.

How did the plant where Marylee works come to develop such a product? First, a need for it was established. Then, the laboratory work was done, mostly on the east coast. This phase of the operation determined the necessary ingredients. The next step involved scaling up the product - making it in bigger and bigger quantities. Then, a specialist was consulted to figure out just how much of the product would be needed throughout the country. Finally, plans for a new plant to produce the new product were begun. This plant would be in production, or "on line," as Marylee says, in about a year, when all of the phases of design, development, and building are complete.

One of the early stages of plant design has involved deciding on the placement of equipment pieces. "It's like a puzzle," Marylee ob-

serves. "We start with a model of styrofoam pieces." Then the pieces are moved around until the arrangement is achieved.

Along with decisions like these, other issues must be considered. For example, the plant must be environmentally sound. It must not discharge anything hazardous out into the river or up into the air.

The product itself poses some particular problems for Marylee and the other engineers. Since it is a salt, almost the consistency of a powder, it will stick to itself and to the sides of the conveyor chute as it is being readied for storage before shipment. The engineers have had to figure out how far from the chute the storage bins should be and how big they should be. They also need to determine how much heat it will take to dry the material if it gets too wet. Many questions must be answered: How much power will be needed to move the material? What will the fuel costs be? Are there special regulations which must be followed?

Marylee did a time study to see how many people will be needed for the new plant. She had to determine what each person will do on each shift, where the workers will eat, how they will move from place to place, and so on. Obviously, Marylee and the other engineers have had to think about lots of different things during the development of a whole new plant and the design of the plant to produce it.

Once the plant becomes operational, Marylee will be in line for a supervisor's position. In that job she will be dealing more with people than with chemicals or calculators. "Engineers are always management material," she says. "They're always looked at as people who have potential to manage other people. However, even though alot of them can manage time and studies, they cannot necessarily relate to people. Nevertheless, this is how the system works."

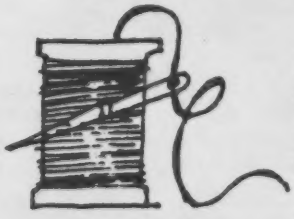
Marylee's early training with her company will help her with her new responsibilities, because she started out on shift work. Her hours rotated around the clock just like those of the regular plant employees. Sometimes she worked the evening shift; sometimes she worked the midnight shift; sometimes she worked the day shift. This kind of a schedule is quite taxing. Marylee now understands more about the people who work this way their whole lives.

Many of them have a definite set of ideas about women, what they are and are not supposed to do, she notes. In the beginning, since Marylee was the first woman to be out in the plant on shift work, the men felt that she did not belong there. Her youth and small stature also made it difficult for the men to accept her as their temporary boss. They resisted the idea of taking advice and orders from her.

However, Marylee solved the problem by speaking frankly with the men. She recalls telling them: "There's nothing we can do about this, so if you'll do your jobs, I'll support you, and we'll do fine." That spirit of cooperation worked well. Now Marylee laughingly suggests that hiring women in pairs might make unusual work situations easier!

One piece of equipment Marylee learned to work with in the main plant is a huge gadget that tests sizes of little particles of phosphates. It consists of a series of screens. The top deck is coarse mesh; the bottom deck is very fine mesh. The machine is built on a slant, and as it shakes, any oversized particles are shunted off. They are then run through a mill and sent back through the screening process. The machine can test 18,000 pounds of a material an hour and helps the company keep their products uniform.

Running this machine, manipulating model pieces of equipment, doing time studies - all of this work and more is part of being a chemical engineer and Marylee enjoys it. However, she does wish that her college had been less specialized and more workable for the person going out into industry. She had no courses in personnel or communication skills in school. Also, she would have liked more mechanical and electrical engineering preparation. Marylee would like to see more young women branch out in their high school courses, too - maybe take auto mechanics and mechanical drawing. It's important, she feels, to gain a perspective on simple machines - in many lines of work.



Not all of Marylee's life is her work, of course. She is married to a lawyer. They combine marriage with two careers by following a basic formula: a happy home equals a happy job. They give their personal life top priority in their lives, and sometimes this commitment means making time to talk and to listen together. They share activities like gardening, skiing, and roller skating, and Marylee likes cooking and sewing. She has not forgotten her music either. She plays the recorder, a small flute-like instrument, for her own satisfaction and with others once a week.

In the future Marylee and her husband would like to have children. She does admit, however, that juggling a demanding career with a young family will be a problem. "I envy women who have jobs that can be cut to part time. Four hours is enough to get you out of the house - so you can come back and be a good mother. But an eight-hour job is a very hard thing."

Marylee has seen how difficult it is for some full-time working mothers with small children to manage their lives. She knows that she

will have to solve the problems for herself even if it means changing the thrust of her career - teaching, possibly, instead of working in industry.

"I want to raise my own children. I want my own value system to be part of their lives and nobody else's. I want to see their first steps.

Whatever way the future goes for Marylee Southard, the road promises to be exciting. "Don't be afraid to take chemistry," she urges. "Just because your friends say it's terrible, don't take their word for it. In order to do what you want, you can't be intimidated by anything."

Marylee Southard, chemical engineer, definitely has not been.

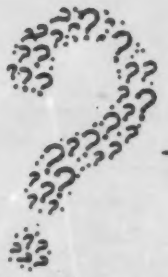
CONTENT QUIZ

1. What other career interest did Marylee have besides chemical engineering?
2. What is made at the plant where Marylee works?
3. Who influenced Marylee in her choice of occupation?
4. What is the main difference between a chemist and a chemical engineer?
5. What will be two uses for the new product that Marylee has helped to develop?
6. List a least two problems Marylee and the other engineers have had to consider in their plans for the new plant.
7. What new position will Marylee be considered for soon?
8. What is one piece of machinery that Marylee worked with in the main plant?
9. What courses would Marylee like to see young women take in high school?
10. What musical instrument does Marylee play?

MAKE UP TWO ADDITIONAL CONTENT QUESTIONS OF YOUR OWN AND WRITE THEM BELOW:

1.

2.



ANSWERS TO CONTENT QUIZ

1. Music
2. Products for food and detergent industries
3. Father, family, science teacher
4. A chemical engineer works in larger quantities than a chemist.
5. To keep food fresh and appetizing; to keep insects and larvae out of grain
6. Pollution potential, equipment placement, storage and movement of the material, location and size of storage bins, etc.
7. A supervisor's position
8. A testing machine made of successively finer screens
9. Auto mechanics, mechanical drawing
10. Recorder

WORDS TO KNOW

As you read the list of words below, circle those words which are new to you.

THEN:

1. Try to find the meaning of each word circled by using context clues in the story.
2. Check your guess by looking in the dictionary for the meaning of the word.
3. Write an original sentence using the word.

advice
appetizing

blueprints
calcium
calculator

chemical
chemist
chemistry

commitment
communication
consistency

conveyor
cooperation
crescent

design
detergent
discharge

electrical
engineer

enthusiastic
environmentally
envy

formula
gadget
geology

goggles
grooming
hazardous

indigent
ingredients
inhibited

intimated
juggling
laboratory

manipulating
mechanical

model
operational
particles

perspective
petite
phases

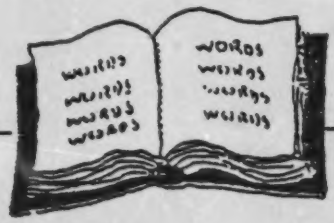
poses
potential
preservative

priority
product
production

puzzle
recorder
responsibilities

scientific
screening
shift

specialist
stature
styrofoam



IDEAS FOR WRITING

Themes:

1. Write a profile of someone you know who has an interesting or unusual occupation. Include direct or indirect quotations and anecdotes about the person's schooling, job, and experiences.

2. Write an expository essay explaining your possible occupational choices, and answering these questions: (1) Who or what has influenced you? (2) Why does the profession have particular appeal for you? (3) What rewards and/or problems do you anticipate?

Paragraphs:

1. Try writing the introduction of this profile in your own words, emphasizing a different idea in the first line. Then write a paragraph discussing the relative merits of your version and the original, keeping in mind the requirements for an introduction: (1) getting the reader's interest, (2) announcing the topic, and (3) giving the slant that will be taken on the topic.

2. Find a descriptve paragraph in this profile and write a paragraph answering these questions: (1) How does the writer help you visualize what is being described? (2) What senses are involved in creating this description? (If you have difficulty locating a descriptive paragraph, try the one beginning: "One piece of equipment Marylee learned to work with in the main plant is a huge gadget that tests sizes of little particles.")

3. Write a descriptive paragraph about a machine or tool that you know about or use. Concentrate on sense-related words to help the reader visualize as completely as possible what you are describing.

4. Write an expository paragraph explaining one of the problems Marylee has had on the job, its causes, and her solution.

5. Write a persuasive paragraph arguing for or against the idea that chemical engineers should be men.

IDEAS FOR PROJECTS

1. Collect pictures from magazines and newspapers which show women at work in occupations usually considered for males only. Create a collage with your pictures.

2. Sketch a diagram of the testing machine. Label its parts.

3. Construct a small scale hand-workable model of the triple-screened testing machine. Test various particles, such as cereals or sands, for uniformity. Analyze your findings.

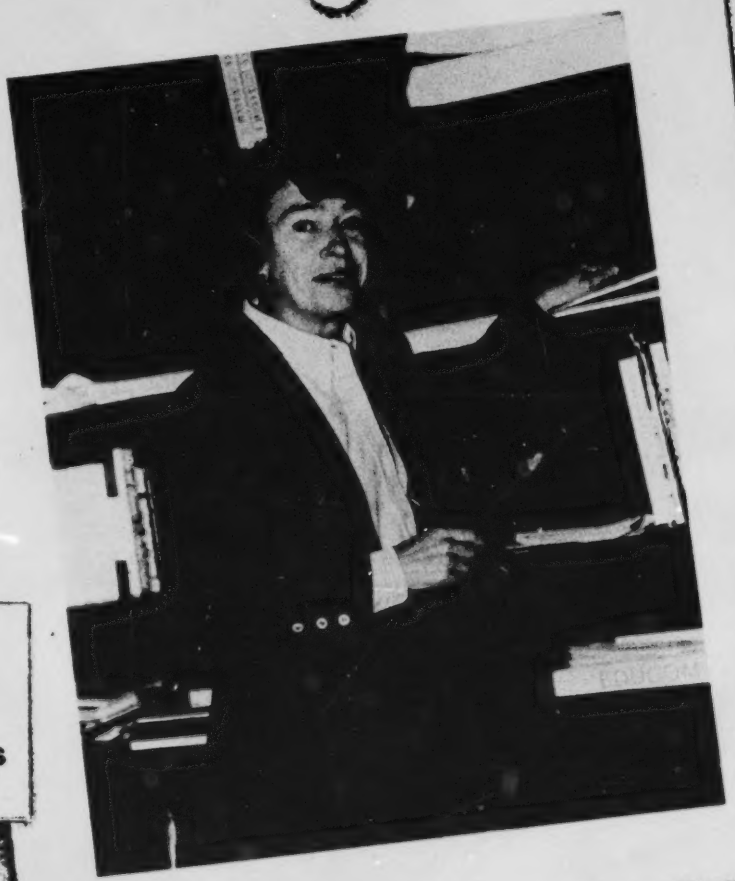
4. Draw a picture of Marylee at work in the plant, or at her desk, after locating sentences in her profile which give you ideas for specific things to include.

5. Make a list of general and specific advice for students who are trying to decide about school courses related to possible future careers. Design a poster for your classroom using this list.

In a shallow container (e.g., the top of a fast food restaurant styrofoam sandwich container) mix ½ teaspoon salt, ½ cup white glue (e.g., Elmer's glue®), and ½ cup liquid laundry starch. Stir for 30 or more beats and then knead it by hand. The resultant "Glurch" bounces, stretches, tears and does a number of other fascinating things. COMETS Science's Product Improvement describes this and other activities which can be used by a chemist or chemical engineer to interest students in their careers.

Have students make a thick syrup and heat it to temperatures varying from 230°F to 300°F (using a candy thermometer to measure temperature). At ten degree intervals drop a spoonful of the syrup into cool water (careful!) and observe the cooled syrup's brittleness and ability to hold its shape. A chemist or home economist can comment on the effect of heat on physical properties of materials; and students can enjoy a tasty treat. See COMETS Science's Misc. Materials for additional directions for this and other activities.

COMETS: PROFILE



SALLY SEDELOW:
Professor of
Computer Science and Linguistics

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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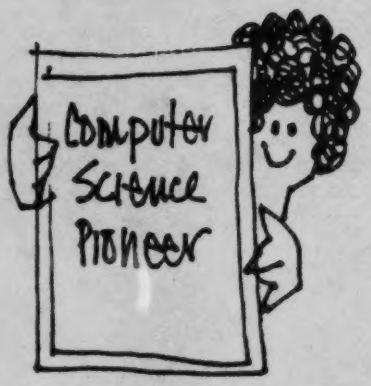
Sally Sedelow

by Ruth Noyce



"How do you use a computer to study Shakespeare?" asked a researcher in a letter to Sally Sedelow. Sally receives many inquiries like this from people who have become interested in computer-aided research in the humanities. At St. Louis University she conducted what was probably the first seminar in the world on how to use computers in the study of literature. Since then, she has given lectures throughout the United States on analyzing literature and language with computers. In this respect, she is a computer science pioneer.

Sally carries out her own computer-aided research at a large midwestern university, where she has been a professor of computer science and of linguistics since 1970. Her work has led to recognition as a pioneer in another respect--she was the first, and only, woman to serve as Program Director of the Techniques and Systems Program, Division of Computer Research and Director of the Intelligence Systems Program, Division of Mathematical and Computer Sciences for the National Science Foundation.

"Sometimes it isn't easy to comprehend what our modern day computer scientists are up to," says Sally. For example, in order to understand what she does in her research, it is necessary to learn about unfamiliar terms like artificial intelligence and discourse analysis.

According to Sally, "Artificial intelligence is an easily misunderstood term. But since it is now a popular term, it is likely to continue being used." She goes on to explain that "artificial intelligence is simply an effort to make the computer solve complex problems. In other words, we try to program the computer to be involved in decision-making by working out rules for its own responses."

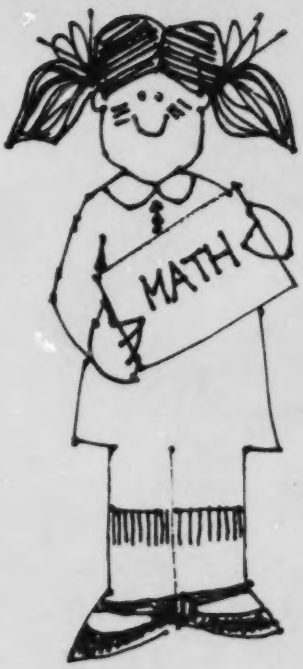
Sally's interest in artificial intelligence started when she was recruited into a research group at the System Development Corporation. She decided at that time to try to program a computer to do the job of a literary critic. "Later, I set up the Intelligent Systems (artificial intelligence) program for the National Science Foundation, including writing the description of what the A.I. system should be and do," she adds.

It is trying to describe a general methodology for discourse analysis that drives Sally's research efforts.

"I am interested in the analysis of style in writing and also in the precise use of language," she explains. "The computer can be used to compare the writings of authors, which may result in determining the authorship of a work that is in dispute. It can be used to search for patterns in discourse that are not obvious to the reader. Sally's purpose is to develop a model to use in finding these patterns. She draws upon various areas of discourse in

her computer-aided analyses--from Paradise Lost to patient-therapist interactions.

Sally has plenty of company in her kind of work in other departments of her university, and some of these researchers are also women. Pat Linn and Lynn Embry, of the Bureau of Child Research, are using computers to answer questions about children's behavior and their environments, such as: Why do some babies cry all the time, and others almost never? How do children learn from their parents? Why do children from poorer families do worse in school than those from higher income families? They, too, are engaged in a form of discourse analysis as they study child-parent interactions. In their research, children and their parents are observed together and notes are taken about the amount of positive feedback and given to the computer for analysis.



Now that computers are being used in so many fields, one can't help but wonder how universities can make enough computer time available to meet the needs of all these researchers. When asked this question, one computer center director explained that microcomputers have been developed to reduce the time needed for advanced analysis of data by the large main computers. The microcomputers make it possible to preprocess data by performing many of the functions. He commented, also, that two of these microcomputers can talk to one another, sharing information and saving time as well as resources.

The fact that computer scientist Sally Sedelow has three degrees in English Literature is not too surprising, now that people are aware of the computer-aided research applications in varied fields. The fact that a person with no professional mathematical background would go into computer science is truly unusual, however. Sally attributes her desire to break into computer science to the stimulating influence of her husband, computer scientist Walter Sedelow.

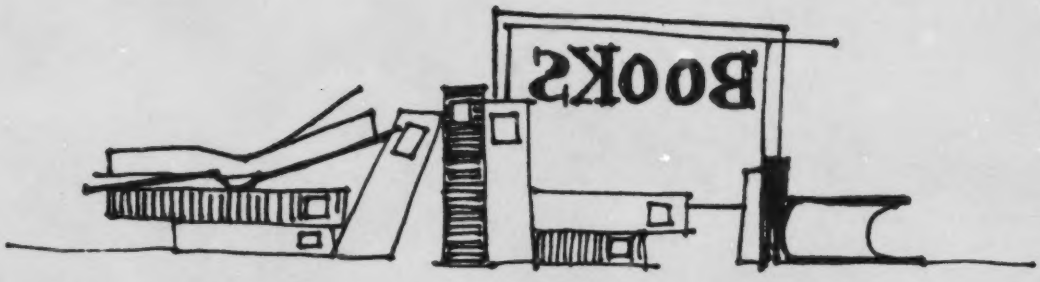
"I regret that I am not a mathematician," she offers. "If I could go back in time to 5th, 6th, 7th, 8th, and 9th grades, I would study math--mathematical principles, proofs, and logic. I was excited when this kind of 'new math' hit the public schools and saddened when it so abruptly began to leave, to be replaced by the 'basics.'"

Sally grew up in a small Iowa town of about 1600 at a time when girls could opt for either a career or marriage, but rarely both. Her mother had been a high school teacher, committed to the education and career option for her daughters; and, therefore, all the girls in her family were expected to go to college. Her oldest sister attended college during the depression of the 1930's, which was not usual in her village then.

As a teacher, Sally has a non-confrontational style with students and she derives much satisfaction from both her teaching activities at the university and her invited lectures on computer-aided analysis of literature and language around the country and abroad. She sometimes tires of traveling so far, though, and feels as though she is "on the road" too often.

It takes time to pursue other interests, too, and Sally has several of those. She likes music, particularly playing the piano and singing for fun. Her favorite sporting activities are tennis and hiking. As a hobby, she is co-owner of a bookshop in New Mexico, specializing in Southwestern Americana first editions, and out of print books.

Sally's motto is, "Variety is the Spice of Life," and it's obvious that she practices what she preaches when one looks at her extensive and varied career. She likes exploring the depths of an issue, raising many questions that have yet to be answered. Sally raises the question, and she expects the computer to help her find the answers.



CONTENT QUIZ

Test your understanding of the information you just read about Sally Sedelow by taking this True-False quiz. Put a T in the blank if you think the statement is True and a F if you think it is False.

_____ 1. Sally's interest in mathematics while growing up led to her choice of computer science as a career.

_____ 2. Computers can interpret literature as literary critics do.

_____ 3. Sentences are the largest units of discourse that can be analyzed with computers.

_____ 4. The term Artificial Intelligence is soon going to be changed.

_____ 5. Sally is trying to develop a model to use for finding patterns in literature.

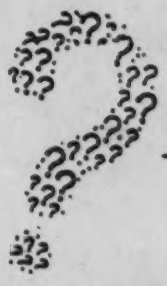
_____ 6. Literature is the only form of discourse Sally is interested in analyzing in her computer-aided research.

_____ 7. There are no other women at Sally's university who are working in computer-aided research.

_____ 8. Two minicomputers can talk to each other.

_____ 9. Sally's husband, Walter, also is a professor of linguistics.

_____ 10. Sally's parents did not encourage her to go to college.



ANSWERS TO CONTENT QUIZ

ANSWERS: 1. F 2. T 3. F 4. F 5. T 6. F 7. F 8. T 9. F 10. F

WORDS TO KNOW

These words have special meanings in computer language. Find out what each one means and write a short definition in the blank:

1. **Hardware** _____
2. **Software** _____
3. **Monitor** _____
4. **Input** _____
5. **Output** _____
6. **Microprocessor chip** _____
7. **Debug** _____
8. **Floppy Disk** _____
9. **Program** _____

By reading Sally Sedelow's profile you can learn more computer terms. Re-read the profile, if necessary, to define these in your own words:

1. **Artificial Intelligence** _____

_____

2. **Discourse Analysis** _____

_____

3. **Stylistic Analysis** _____

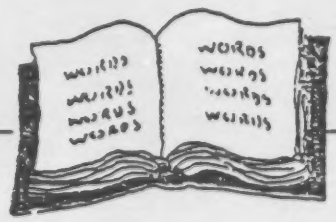
_____

4. **Content Analysis** _____

_____

5. **Preprocessing of Data** _____

_____



IDEAS FOR WRITING

1. What is a microcomputer? Research the subject and write a description, naming the basic parts and telling how one functions.

2. What is the difference between a calculator and a computer? Write a paragraph comparing the two.

3. Although Judy Roitman, a mathematics professor, and Sally Sedelow, a linguistics professor, are in very different fields, the two researchers share a common purpose in their work with computers. Write an essay about the similarities in their basic goals.

4. Write a letter to the computer training center in your area (listed in the Yellow Pages of the telephone directory) asking for information about their training courses, the qualifications needed to enroll, and the job options after completion.

5. Do you know why the postal department uses zip codes? Visit a post office and find out all you can about the use of computers in the postal system. Describe the various uses in a written paper.

6. The computer can help you become a better writer by assisting you in editing and revising your writing. Try to arrange for a resource person to come to your class and demonstrate how "text processor" programs can be used to improve your writing skills.

IDEAS FOR PROJECTS

1. A simple form of computer, the abacus, was developed over 5,000 years ago. The slide rule and electronic calculator are modern examples of simple computers. Read about the history of computing devices and design an illustrated time line to display in your classroom.

2. Explore possible uses of home computers such as "Apple", "Sorcerer," and "Pet". Design a full-page magazine ad for one of them, including a sketch of each use. Do the same thing for classroom and school uses of microcomputers.

3. Study the "Help Wanted" section of the want ads in a newspaper, looking for computer-related jobs (sales representatives, programmers, etc.) Check the Yellow Pages of the telephone directory, also. List all the computer occupations you can find. Post your list and ask others in your class to try to add to it.

4. Read Computers: Tools for Today by Claude J. DeRossi (Children's Press, 1972) which gives you a history of computers, tells how they work, and explains special computer words. Give your class a computer language lesson after you read that section of the book.

5. Read Electronic Brains by Rolk Lohberg and Theo Lutz (Sterling, 1965) which explains computers through diagrams and humorous cartoons. The facts are verified by a computer expert. Prepare several diagrams and cartoons of your own for a bulletin board to teach others about computers.

6. If you are especially interested in math, you will enjoy reading The New World of Computers by Alfred Lewis (Dodd, 1965). The author explains the basic principles of computer mathematics.

7. To learn about the experience of literature teachers using computers, read Travels in Computerland...A Full and True Account of the Implementation of the London Stage Information Bang by Ben Ross Schneider (Addison-Wesley, 1974).

Invite a computer professional or amateur to class to demonstrate how a computer works. COMETS Science's Program It suggests activities for this person to do with students. Read in Program It about how Lord Byron's daughter, Ada Lovelace, wrote the first computer program. Have students read other Profiles and report to the class on the influence of fathers on many of the daughters featured in the Profiles.

COMETS: PROFILE

DIANE SANDERS:
Dietician

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Diane Sanders

by Ruth Noyce

There weren't any boxes of cake mix or "Hamburger Helper" on the shelves of the family pantry when Diane Sanders was growing up. "Starting from scratch" was the motto of the cook in that metropolitan household. Food preparation was a big part of family life, especially for Diane, the oldest of four children. She knew from the time she was very young that a nitch somewhere in food service would be her career choice.

Interestingly enough, though, Diane avoided home economics courses in junior and senior high school, preferring instead to be involved in the scientific fields of biology, physiology, physics, and chemistry. Even after entering college, she chose to take the natural sciences, whenever possible, along with the basic courses, like English, math, and history, that everybody takes during the first two years. As a junior, however, she elected to major in foods and nutrition, taking courses with such titles as Basic Nutrition, Food and Research Techniques, Diet Therapy, Nutrition Throughout the Life Cycle, and Food Management. Later, as a graduate student, Diane specialized in the area of nutrition for the aged, which involved her in hospital and nursing home research with the elderly population.

"My goal at that time was to be in nutrition research," Diane explains. "Actually, I have gone from one end of food services to the other in my career. I have done a lot of research, some college teaching and some hospital and nursing home dietary service. I am now teaching dietetic assistants in vocation technical school, so I have had a smattering of experience in most areas of food service."

In her position as coordinator and instructor for a training program that prepares men and women to be supervisors in the food service field, Diane must see that these people have exposure to every aspect of food service. They must know about food production management, sanitation, safety, basic nutrition, service, diet therapy, personnel management and operations management. Her students spend three days each week in classroom lecture-discussion and then work two eight-hour shifts in a variety of food service operations within the community. They are not paid for this work, but they gain exposure to the field in this way. They work in school lunch programs, hospitals, nursing homes, public health, extension programs, bakeries, fast food places, and restaurants, according to Diane. This is how they learn preparation of food, scheduling of employees, ordering of food, supervising of cooking and servicing of patients. They also learn about the ways equipment is situated in certain kitchens.

"The students who come to this vo-tech school are either seniors in high school or high school graduates who have had some work experience," she adds. "As a recruitment effort, we offer tours for sixth graders, and we're surprised at the amount of technical information they have. They know the names of the minerals and vitamins, they know what they do, and they know whether they're long or short on some of them. Nutrition education is in a big swing at this time - a very important part of children's daily lives."

Diane has found that a scientific background is not the only ingredient vital to success in her food services career. "It's not only what you know that you bring to a job, but also how you get it across. I'm sure my store of information doesn't do any good if I am not effective in relating it to other people. In this field, a person never has enough skill in human relations. Ninety-five percent of employment problems are caused not because people don't know <u>what</u> to do, but because they don't know <u>how</u> to do it. Therefore, they can't get along with their fellow employees."

There is also a great deal of paperwork attached to being a dietician. Documentation is particularly important in the health care field because everything the dietician is responsible for must be noted on the patient's chart. "We also have to know enough medical terminology to be able to read the chart and interpret orders from doctors and nurses," comments Diane, "particularly in the diet situation where acute care is our thrust."

Sometimes, especially in large city hospitals, a dietician is actually part of the health care team, making rounds with the physician and nurse. The diet order is often written by the doctor and implemented by the dietician. For example, if there is a diet order for a thousand calories, it is up to the dietician to interview the patient, deciding what kind and how much breakfast is wanted, what kinds of snacks are enjoyed, etc.

"In most televised versions of hospital life, you tend to see only doctors and nurses running around the halls," says Diane. "Dieticians are usually kind of a hidden group. We are supportive personnel, serving meals to staff, patients, visitors, and anyone else who is around. Our day starts at 4:00 a.m. in many institutions, and it involves us in quite a variety of situations."

Diane thinks the hardest thing her students have to learn is that an institutionalized person's moods will be different from one day to the next, whether it is a short-term stay in a hospital or a long-term stay in a nursing home. "We've had students who are making rounds with dieticians encounter a tray of food flying across the room at them. You know, everybody has good days and bad days. Sick people tend to take more things out on the staff, and food is certainly a good thing to pick on. It is an inanimate object that can be blamed for many ills. We have to learn to read between the lines.

Verbal and written communication skills are especially important to Diane's students as they disseminate food service information throughout communities. They may visit with four or five families in a day, helping them plan budgets. They sometimes help a mother plan a menu cycle for a child with allergies or help an older person with health problems plan special menus. They often instruct new mothers on a variety of things, such as preparation of formulas, problems with formulas, and infant feeding techniques. Community nutrition is popular right now, according to Diane. Teaching people about good health practices before they are sick and hospitalized is considered an effective preventative measure.

Diane claims to learn as much from her students as she hopes to teach them. "I certainly enjoy working in a school and community with an assortment of people in differing situations," she comments. "It is a very gratifying experience."

This dedicated teacher has many other interests, too, once she tears herself away from her school. Because she lives on a lake, she is able to enjoy her favorite water sports - swimming, skiing, and sailing. She hunts now and then with her hunting dog (one of several pets), and there are family members nearby, with whom she frequently spends time.

As Diane reflects about her own past and future career goals, she finds herself offering some advice to young people: "Be as open minded as you can, exploring every avenue that is available to you. You'd be surprised at the many different ways that you can put a certain educational background to use. I always thought I knew exactly what I wanted to do and had very definite goals, yet I've ended up in a position that is nowhere close to where I started my training. I've enjoyed everything I've done, and there are many jobs I'd like to go back to, but as I performed the various food service tasks, I acquired managerial and administrative skills. Now I find myself working at the top where I am directing other people to do the actual delivery of food services. I guess that is job advancement and progress. My advice to students is that you should always think creatively about new positions and not be limited to what you are presently doing. It has been a great learning experience for me to discover the many ways in which my training and background in nutrition can be applied in a variety of careers."

CONTENT QUIZ

Check your recall of information about Diane Sanders and her career by answering the true-false questions below.

After reading each question, place a T in the blank preceding it if you believe it is true and an F in the blank if you believe it is false:

------- 1. Diane Sanders gave little thought to what career she would like to prepare for while she was a child.

------- 2. Her chief interests in school were in natural sciences.

------- 3. Nutrition for the aged was Diane's specialty.

------- 4. Teaching dietetic assistants is the only aspect of food service she has experienced so far.

------- 5. Dietetic assistants are trained to be supervisors in the food service field.

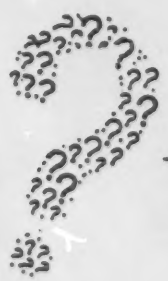
------- 6. Today's sixth grader doesn't know much about nutrition, according to Diane.

------- 7. Diane believes that human relations and communication skills are as important as a science background to a dietician.

------- 8. Doctors decide which foods patients will be served in hospitals.

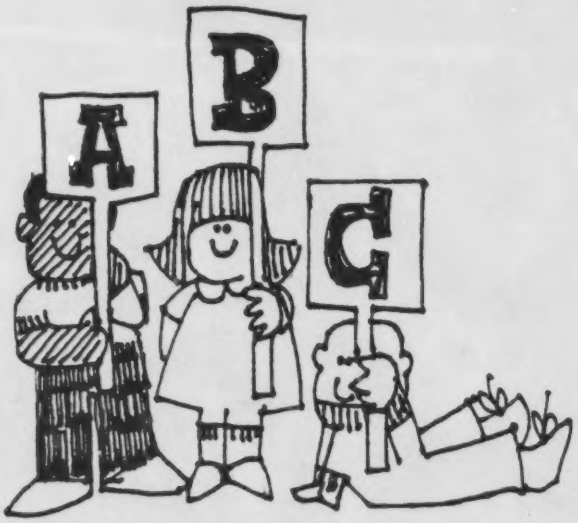
------- 9. Diane's students do not have opportunities to work out in the community at present, but she hopes the day will come when community nutrition is popular.

------- 10. Diane advises students to choose a career early and stick with it.



ANSWERS TO CONTENT QUIZ

Answers to Content Quiz: 1. F 2. T 3. T 4. F 5. T 6. F 7. T 8. F
9. F 10. F

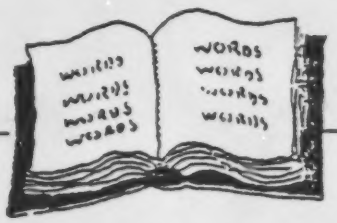


WORDS TO KNOW

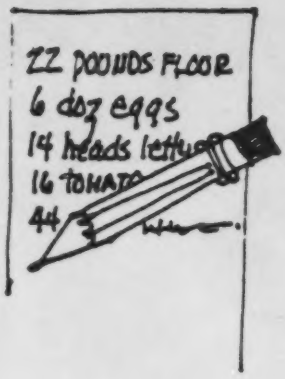
A nutritionist or dietician could answer all of the "difference" questions below. Can you? If not, use your dictionary!

WHAT IS THE DIFFERENCE BETWEEN . . .

1. a VITAMIN and a MINERAL? ----------
2. a DIETETIC cola and a COCA-COLA? ----------
3. DEXTROSE and SUGAR? ----------
4. a NUTRIENT and an ENZYME? ----------
5. an ACID and an AMINO ACID? ----------
6. POLYUNSATURATED MARGARINE and BUTTER ----------
7. DIGESTION and INGESTION? ----------
8. a CARBOHYDRATE and a PROTEIN? ----------
9. a CALORIE and a PRESERVATIVE? ----------
10. CHOLESTEROL and PEPSIN? ----------



IDEAS FOR WRITING



1. Write a story describing a typical day in the life of a dietary assistant, based on the activities Diane Sanders' students engage in during their training program.

2. Write to your county extension agent requesting information on common nutrition-related problems and nutrition know-how for students. Design a nutrition learning center for your classroom with the materials you receive.

3. Working with the information in the nutrition learning center, produce a "Nutrition News" flyer with others in your class. Include news stories, features, comics, art work, recipes, and editorials about nutrition.

4. Investigate how the nutrients in fruits and vegetables promote growth and good health by writing a letter to this organization asking for informational materials:

   Produce Marketing Association
   700 Barksdale Road
   Newark, Delaware 19711

5. Produce a slide show on food service careers to share with your class, using information from the profile of Diane Sanders. Write a script for a narrator to read and design some slides, drawing with transparency pens or pencils on bleached slide rejects.

IDEAS FOR PROJECTS

1. Conduct a survey within your school to determine whether or not any improvements in the food services are necessary or desirable. Summarize the opinions of teachers, students, cafeteria workers, custodians, and administrators and present your conclusions and recommendations to the food services manager.

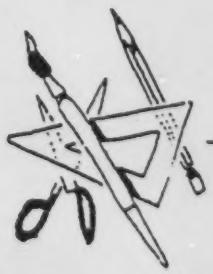
2. Brainstorm with other students to create a list of careers related to food. Have each student in the group seek out and interview a person working in one of the careers listed, asking about the nature of the career, preparation needed, its satisfactions and its difficulties. Present the results of your interviews in class.

3. Record the lunch menus in your school cafeteria for one week. Using a calorie chart, list the number of calories in each item and calculate the total calorie count in the various meals. Display this information in your classroom for the benefit of the weight-watchers, explaining also how many calories are used by a normal person each day.

4. Take a tour of your school cafeteria, observing the cooking equipment used. Describe how certain appliances differ from those in the kitchen of your home. Which of them require special training to operate?

5. Conduct an experiment to find out how much consumers pay for sugar per pound when they buy pre-sweetened cold cereals. How does this compare to the price of sugar per pound if purchased in a ten pound package?

Mix flour, sugar, and water into a thick paste and divide the paste into two equal parts. Pour one portion of the paste into one jar and sprinkle yeast on top of the paste. Mix yeast together with the second portion of paste and pour this mixture into a second jar. Cap both jars with a balloon, place the jars in a warm spot, and observe the jars throughout the day. As the yeast sprinkled on the paste makes gas, the balloon on its jar will fill; but as the mixed yeast produces gas, the gas will be trapped, the paste will rise, and the balloon will remain flaccid. A home economist can visit your class to discuss how this demonstration shows how yeast works to make bread rise. COMETS Science's Household Science describes this and similar activities.



COMETS: PROFILE

JUDY ROITMAN:
Mathematician

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Judy Roitman

by Ruth Noyce

Interviewer: Would you tell us a bit about how you became interested in math?

Judy: As a child, teenager, and college student, I lived in New York City, where I was born. I remember having an interest in math as a junior high student but felt that everything had already been done by other people (an idea my math teacher reinforced). So I preferred to write poems and play the piano. A book I read in junior high school (1, 2, 3, Infinity) planted a seed that stayed in the back of my mind, because it had a neat idea in it about real numbers being uncountable. Even though I found my high school math courses boring, the concept of creative mathematics fascinated me.

In high school, I believed strongly that women could not be good at math or science. I remember my tenth grade teacher telling us that she scored the highest on a statewide math test. My thought was that a woman ends up teaching math, no matter how high she scores on a test, because she can't really be good at math. I don't know where the idea came from, unless it was a result of the culture I grew up in. In my high school, most of the bright girls went on to major in home economics or education. Many years later, after I had my Ph.D. in math, my father got mad at my mother for making some arithmetical errors. "What do you expect from a woman?" he said. "They can't balance checking accounts."

I: Did you major in math in college?

J: No. I went to a women's college and they urged me to take math, but I refused on the grounds that girls weren't good at it. I also believed that girls couldn't compose music, but gave in when they insisted that I take composition in order to study piano. That was a valuable experience for me, because I had a talent for composing and discovered I was succeeding at something I didn't think women could do well. By the time I finished college, I had the confidence in myself to do anything I wanted to do.

I: What were you prepared to do when you graduated from college?

J: My college background was in humanities -- primarily literature and music -- but I knew I didn't want to be a professor of English literature. I had a low opinion of the humanities because there was no way to prove or disprove anything. After I decided to change fields, I took a calculus course and literally stayed up all night working on it. It was the first time I had ever been so interested in something that I stayed up all night to do it. I still didn't think women could be creative mathematicians, though, so I thought maybe I'd go to a graduate school in mathematics and become a college teacher.

I: How did you like graduate school?

J: Psychologically, it was difficult for me because of the sexist attitudes around and within me. Male students would come up to me and say, "Why are you in graduate school? Why aren't you married?" They also treated their female instructors horribly. I had the feeling women could go just so far in mathematics and then they dropped off the earth.

During my third year, a friend told me about an area of mathematics that was new to me and not taught at our university. The biggest leader in this field was a woman in her 50's. We both went to her university to study with her. With her example in front of me, I finally believed I could be a mathematician. I know how important it can be to have a role model - for me it was crucial. I became interested in this branch of mathematics - the funny thing is that what I do now relates directly to what interested me in junior high school - and here I am.

I: Can you tell us a little about research mathematics, in general, and topology, in particular?

J: Telling you what my kind of math <u>isn't</u> may be the easiest way to begin. There are many kinds of topology. What I do is call set-theoretic topology. Set-theoretic topologists do not do applied math. I do not use statistics or computer programming, for example. Many mathematicians have the ability and training to work on applied problems for government and industry, but that is not what I do. What I do with math is abstract, and it is hard to explain to people because it all builds on definitions which build on definitions which build on definitions.

Basically, I take questions that are interesting to mathematicians, questions that nobody knows the answer to, and try to find out what happens. However, it's not like most math because many of the answers can't be proved or disproved with the usual sets of rules (axioms). I always hope to be able to show that an answer is true in some situations and false in others. That shows that our mathematical system has limits and that you can't prove everything with those sets of rules. You might say that I build and explore alternative mathematical universes.

I: Are there many other people around the country doing what you do?

J: Set-theoretic topology isn't very popular in this country. However, about two hundred people go to the big yearly conference in the field. There are also lots of set-theoretic topologists in eastern Europe - Poland, Czechoslovakia, and Hungary. I've travelled to those countries several times.

I: Are there any others in your field at this university?

J: We have enough people for a weekly seminar, which is nice. There are four or five faculty members and a few students. I also call people around the country to keep up with things.

I: What kinds of courses do you teach?

J: Everybody in the department teaches introductory courses--calculus, and even high school algebra and trig. I get upset about teaching the high school courses, because the students are closed off from many majors and careers by not taking that math in high school. There's alot of wasted talent. The courses I teach to math majors and graduate students usually relate to my area of research: logic, set theory, topology, maybe a little analysis.

I: Do you ever want to change what you are doing?

J: Mathematics is always changing! As long as I am doing research, I will never be bored. I probably won't get into administration or move into the applied areas where many of those who have Ph.D's in math work. Some of them work with scientists, engineers, psychologists, economists, and so on. Others enter administrative positions in universities or industries. Others prefer just to teach. I enjoy the research aspect of my job, although it can be both frustrating and rewarding. If I stopped proving things, it would be just another job, but I really feel good when the mathematics works out.

I: What does a researcher in mathematics do?

J: First of all, math is highly creative. You do not have data pools that you analyze. You don't write about what other people have done and call that doing research. When you do research in math you are making up something that no one has ever done before. People ask questions, and this starts you thinking about something. I spend a lot of time answering other people's questions. I often go to conferences, because that's where I find new directions. I have to find out what others are doing and let them know what I'm doing. Last summer my husband and I spent six weeks at a neat conference. I got a lot of work done, and he played housewife.

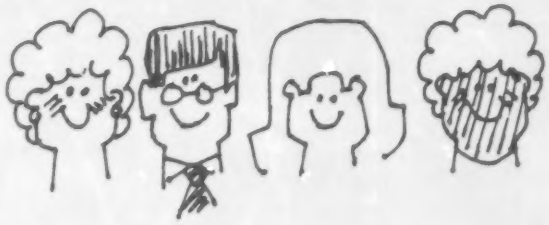
I: Tell us about him.

J: He's a professor in the classics department. We've been married about three years and are both very family oriented. We share the parenting of our baby, which is nice. Our schedules as professors make it easy to mesh careers and family. We can do a lot of our work at home.

I: What is your university life like?

J: Research mathematics is not a 9 to 5 job. There is a great deal of flexibility in my schedule, except for the teaching of my courses. But to be productive and keep up with things I have to work long hours. I look forward to the weekends, often, so I can get my research done. Sometimes I don't get into any research for days or weeks at a time because I'm busy with other things. Then, sometimes I get an idea that I think is going to work and go into it 100%, forgetting about everything else. My husband might wake up at 3:00 a.m. and find me sitting up in bed, clutching my forehead.

I: What do you do for recreation?



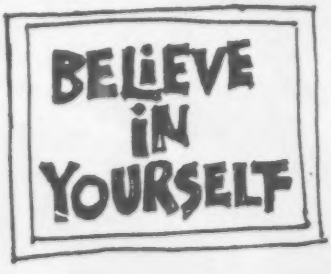
J: I'm pretty uninteresting, as far as hobbies go. I sometimes write poetry. I used to play the guitar but I haven't played it much in the last few years. I like to walk in the mountains, but you can't do that here in the midwest. I love to be with friends -- they're very important to me.

I: From your experience, do you have any words for young women and men?

J: You have to believe in yourself. You have to understand that you are building upon thousands and thousands of years of creative work. You should expect that the ideas you have in junior high school will be ideas that others have had, but that's OK. They were great ideas once and they're still great ideas. Turn it into a positive thing rather than a negative one. The main thing is to believe in yourself.

I: Do you have any advice for students about math?

J: Whatever you think you want to do with your life, take all the math you can get now. You will need math in everything you do. Don't wait until you're in college to start taking it, because you should be taking calculus, statistics, and computer programming then. Even if you plan to go into history or English, you are going to need math. You are more flexible with it -- you are locked out without it!



CONTENT QUIZ

1. What were Judy Roitman's favorite subjects in high school?

2. When did Judy decide to leave the field of humanities?

3. What finally made Judy believe that she could be a mathematician?

4. In what way is mathematics "creative"?

5. How do present high school math courses differ from the ones Judy took?

6. What kinds of job opportunities are open to people with Ph.D's in mathematics?

7. In what department of the university does Judy's husband teach?

8. Describe the lifestyle of Judy and her husband as parents.

9. What advice does Judy give students about taking math?

ANSWERS TO CONTENT QUIZ

1. Poetry and music

2. After she left college

3. A female role model in her field in graduate school

4. Mathematical researchers are always making up something no one has done before.

5. They now teach theory, function, and computer science, which she did not get when she was in high school.

6. Working with scientists, psychologists or economists; becoming administration/ managers for NSF, IBM, etc.; doing research; teaching

7. Classics department

8. Parenting was shared and it was nice; they are family-oriented.

9. Take math courses, for you will need them in whatever you do.

WORDS TO KNOW

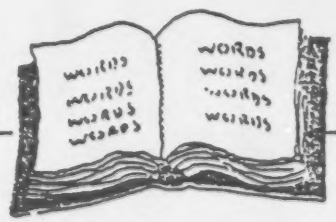
The profile of Judy Roitman contains many words related to the field of mathematics. Find as many of those words as you can by re-reading it. Place each word in one of the categories below:

TYPES OF MATH COURSES	ABSTRACT MATH TERMS
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.

Do you know the meaning of each word you found? If not, find the word and meaning in your dictionary.

ANSWERS: Types of Math courses-- algebra, calculus, logic, geometry, topology, computer science, statistics

Abstract Math terms -- axiom, definition, set, real number, infinity, proof, applied



IDEAS FOR WRITING

1. Find out what an "applied science" is and explain it in a paragraph.

2. Research the subject of "topology" and write a description of the field, explaining how it differs from algebra.

3. If Judy Roitman were coming to your class to speak and you were to be the one to introduce her, what would you say about her in your speech? Write the introduction you would give her.

4. Write a "Letter to the Editor" giving your reasons for supporting required math courses for all junior and senior high school students in your community.

5. Which of the careers mentioned by Judy as options for a person who has a Ph.D. in math sounds most appealing to you? Write your reasons for choosing that career as your favorite.

IDEAS FOR PROJECTS

1. Read the profile of Sally Sedelow, professor of computer science and linguistics, to find out how computer science is applied in the fields of linguistics and English literature. How does Sally's opinion of the importance of math to other careers agree or disagree with Judy Roitman's opinion?

2. Learn enough about mathematical "proofs" to demonstrate one for other students.

3. Find out how math is applied in a variety of careers by interviewing each of these people in your school: librarian, secretary, custodian, principal, science lab assistant, coach, and art teacher. Summarize your information on a "Math at Work" chart.

4. Find a copy of 1,2,3, Infinity and read it. Jot down the ideas that interest you most and share them with others in a book talk.

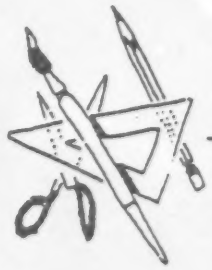
5. Browse in the nonfiction section of your school library numbered 500 for interesting books about mathematics:

   If you would like to know more about logic, look for Yes-No; Stop-Go: Some Patterns in Mathematical Logic by Judith Gersting and Joseph Kuczkowski (Crowell, 1977). This book explains the "AND" and the "OR" ideas in logic through one story about the Whiffle/Piffle people in an imaginary castle and another about railroad switching.

   Finite and infinite numbers are explained in Solomon Grundy, Born on Oneday by Malcolm E. Weiss (Crowell, 1977), and there are questions and activities you might enjoy.

   You can learn how to solve everyday problems by using the math concepts of MEAN, MEDIAN, and MODE in Averages by Jane J. Srivastava (Crowell, 1975).

COMETS Science's Figures Don't Lie has a graph with missing data which can be reproduced and distributed to students who can be asked to fill in the missing data. They must recognize the graph's basic pattern and extend that pattern to fill in the missing data. Similiarly, people use math to figure out patterns in data to help make predictions.



COMETS: PROFILE

MARILY RHUDY:
Pharmacist

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
Copyright, 1982

Marily Rhudy

by Carolyn Derusseau and Ruth Noyce

Did you know that some eye shadow used to be made from fish scales? That a drug called "Premaron" is made from the urine of pregnant mares? That taking aspirin with orange juice, over a period of time, can cause stomach ulcers? These interesting and important facts are samples of the kinds of information pharmacist Marily Rhudy can share with you.

As Marily explains, "Pharmacists do much more than just fill prescriptions for people. We counsel them about how to properly take medicines, what possible side effects to look for, and which drugs might be best for them to use." She considers pharmacists well qualified to counsel people about drugs. "We generally take at least five more semesters of pharmacology (a study of the reactions and properties of drugs) than doctors take during medical schooling." While pharmacists do not prescribe medicine, they are required by law to counsel their customers about medicine when dispensing it.

"People don't seem as afraid of a pharmacist as they are sometimes of other health professionals," Marily notes. "I enjoy the frequent and direct contact we have with people who are taking medicine and need help. As a woman and mother, I especially like counseling with expectant mothers."

Drug stores are not the only places in which pharmacists are found. They may choose to be in a hospital pharmacy, or to do research in a laboratory for a pharmaceutical firm to discover and refine new drugs. The government also hires pharmacists to test drugs for the FDA (Food and Drug Administration) and expose those which are unsafe for public use. Pharmacists may be found working in Washington, D.C., and most state capitols as lobbyists for pharmaceutical companies. Depending on the situation, pharmacists may work with the public, doctors, politicians, scientists, or even animals (when doing research).

Marily Rhudy is as diverse in her interests as the pharmacy profession seems to be. In her thirty-one years, she has grown from a young school girl, who played with snakes and lizards in western Kansas, to cheerleader, to pharmacy owner, president of her own consulting firm, active member and past president of the Kansas Pharmacy Association, wife of an attorney and mother of four children.

Marily attributes much of her success to the influence of her father. "He always expressed complete confidence in me and my ability

to accomplish whatever I set out to do. It never occurred to me that I could fail at anything if I worked hard enough and had enough self-confidence." With a smile, she adds, "After buying my pharmacy, I realized that other factors such as the economy, an understanding banker, and pure luck also have a bearing on one's success! Ultimately, though, it is self-confidence and hard work that really count the most."

In Marily's opinion, being a woman has not hindered her pursuit of a career. She says, "Discrimination is more of a personality thing than a male-female thing. It most often occurs if you are not aggressive and self-confident, regardless of your sex."

An interest in science goes back many years for Marily. She still remembers the Christmas when she was nine and received her first chemistry set. Her parents always wanted their children to be unique and outstanding. They allowed and encouraged Marily to pursue anything she was interested in even if it meant hunting for lost lizards and snakes in the house.

Many sincere and dedicated teachers also helped stimulate Marily's interest in the physical sciences. In high school she was chosen to work under a federal grant in a college chemistry laboratory. She had to drive 120 miles every Saturday to do it, but felt that the effort was well worthwhile.

Marily has found that being a pharmacist can fit easily into a mother's schedule. A pharmacist's hours can be flexible and tailored to fit her children's school hours. Marily is no longer a typical drug store pharmacist, however, and rarely does she work only a nine-to-five day.

Marily and her family usually get up around 5:30 or 6:00 in the morning. It takes two hours for all of them to eat, dress, and get out of the house. Marily says it is definitely a team effort each morning. After dropping the children off at their respective day care or school settings, Marily is off on a thirty minute drive to start her day's activities.

Some mornings she does several hours of consulting work for the Medicaid Program before going to her pharmacy, and two mornings a week she has a 7:00 a.m. meeting with state legislators. From 10:00 a.m. until noon, Marily usually manages her pharmacy. This involves doing bookwork, filling prescriptions, and talking with employees. One afternoon a week is spent with each employee, discussing special problems. Two afternoons are spent in meetings of the Pharmacy Association or her consulting firm. This consulting firm consists of a pharmacist (Marily), an accountant, a nutritionist, and a physical therapist. They are currently geared for handling nursing home problems but Marily plans to expand the firm's functions in the future.

Taking a lunch break is something that Marily seldom finds time for during her busy day, and rarely do she and her family have a sit down dinner. Having quality time with their four children is more important to Marily and her husband than eating a square meal. The evening hours and weekends are spent together as a family with as much individual attention given to each child as possible. Marily says that at times it seems like just too much to handle, but she believes that in three or four years, as the children get older, life will not be quite so hectic. She feels that having both a family and a career is well worth the extra effort and energy.

Besides her own dedication, Marily cites several other factors which have made it possible for her to be a pharmacist, run a consulting firm, and participate in Pharmacy Association activities. Chief among these is a husband who is "200% a father" and very supportive of her work and responsibility. Another necessary factor is the high quality of care available for her children. Marily says that "if you see that your children are happy, it is easier for you, as a mother, to go to work."

For Marily, the ability to mix a career and family is also a matter of setting priorities. "My husband and children come first, my job second, my church third . . . and all other things must fall by the wayside," she emphasizes. She doesn't have time for some of the social activities that her friends engage in, but Marily is happy with her choice of life styles and derives a great deal of satisfaction from what she does.

CONTENT QUIZ

Can you tell a FACT from an OPINION? The profile of Marily Rhudy contains some examples of each. Remembering that a FACT can be VERIFIED as being TRUE while an OPINION cannot, read each statement below and decide whether it is a FACT or an OPINION. Place an F by each FACT and an O by each OPINION.

1. ------ People aren't as afraid of a pharmacist as they are of other health professionals.

2. ------ All pharmacists enjoy frequent and direct contact with people who are taking medicine.

3. ------ Pharmacists may choose to be in a hospital pharmacy or to do research in a laboratory for a pharmaceutical firm.

4. ------ Marily Rhudy is the mother of four children and the wife of an attorney.

5. ------ It is self-confidence and hard work that really count the most in anyone's success.

6. ------ Being a woman does not hinder the pursuit of a career.

7. ------ In high school Marily was chosen to work under a federal grant in a college chemistry laboratory.

8. ------ Being a pharmacist fits easily into a mother's schedule.

9. ------ Marily and her family usually get up around 5:30 or 6:00 in the mornings.

10. ------ Life will not be hectic for the Rhudy family in a few years.

ANSWERS TO CONTENT QUIZ

Answers to Content Quiz:

1. O 2. O 3. F 4. F 5. O 6. O 7. F 8. O 9. F 10. O

WORDS TO KNOW

Use a dictionary to answer these questions about pharmacy terms:

1. What is the origin of the word "pharmacy"?

   ---

2. How does a pharmacist differ from a pharmacologist?

   ---

3. Drugs have generic names and brand names. What is the difference?

   ---

4. What purpose does each of these types of drugs serve?

   tranquilizer ---

   sedative ---

   stimulant ---

   anesthetic ---

   antihistamine ---

   antihypertensive ---

   analgesic ---

   antacid ---

   vasodilator ---

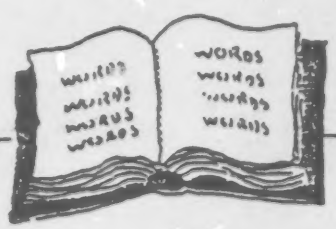
   antiasthmatic ---

   decongestant ---

   expectorant ---

   antiarrhythmic ---

   antinauseant ---



IDEAS FOR WRITING

1. Write a letter to the professional pharmacy association in your state capitol requesting information about pharmacy-related careers. Prepare a pharmacy career packet with the printed materials you receive.

2. What does a lobbyist do? Find out about the activities of lobbyists for pharmaceutical companies in your state capitol or in Washington, D. C. Then write a job description for this career to be used by a pharmaceutical firm in advertising such a position.

3. The profile of Valya Visser, neonatologist, emphasizes that pediatricians are continually making life and death decisions. What kinds of decisions must pharmacists make in their work? Write a paper comparing the decision-making aspects of both careers.

4. Research one of these topics and prepare a written report:

   Pneumonia and its Treatment
   The History of Penicillin
   The Present Status of Aspirin

5. The following books report the facts about the major beneficial and harmful drugs. After reading one of them, write a short review and evaluation of the contents of the book, recommending it (or not) to friends:

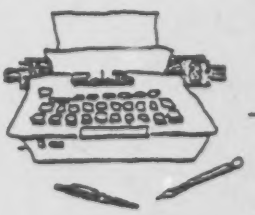
   Drugs and Man by John Gabriel Navarra
   (Doubleday, 1973)

   The Good Drug and the Bad Drug by John S. Marr, M. C.
   (Lippincott, 1970)

   Miracle Drugs and the New Age of Medicine by Fred Reinfeld
   (Sterling, 1962)

   The Ups and Downs of Drugs by Kathleen Elgin
   (Alfred Knopf, 1972)

   Drugs: What They Are, How They Look, What They Do by Frank Gannon
   (Harcourt, 1972)



IDEAS FOR PROJECTS

1. Design a bulletin board for your classroom, advertising the jobs available for pharmacists. Include information about salary ranges, required skills, and duties.

2. Language skills are important in many careers. Select a career of interest to you and think about the ways in which written and oral verbal skills are used by professionals in that field. List them and post the list in your classroom.

3. Find out all you can about antibiotic drugs - their history, uses, types and the diseases they cure. Present this information in a poster-talk to your class.

4. What are the most common side effects caused by interaction of drugs in the human body? Read The Pill Book by Harold Silverman and Gilbert Simon (Bantam, 1979) or Medicine by Herbert Zim (William Morrow, 1974) for answers to this question.

5. What are the top ten prescription drugs used in the United States? What diseases do they cure? Interview a druggist to get this information and report it to your class.

6. Prepare a pharmaceutical learning center for your classroom. Write to the Federal Drug Administration explaining your project and requesting materials for the center.

7. Read Medicine Show by Mary Calhoun (Harper and Row, 1976). Design a sample advertisement for patent medicines using some quotes from the days before there were pharmaceutical laws.

Add one teaspoon of baking soda to a cup of water and a teaspoon of cream of tartar to a second cup of water. Nothing much will happen except the powders will dissolve. Next mix together equal amounts of baking soda and cream of tartar and add a teaspoon of this mixture to a cup of water. It will bubble vigorously. Invite a pharmacist to class to use this activity to illustrate the pharmacist's important job of advising people on the potential interactions of drugs with food, alcohol, and other prescription drugs. COMETS Science's Pharmacy describes this and other activities pharmacists could use to whet student interest in science and to inform students about a pharmacy career.

COMETS: PROFILE

JANICE MORGAN:
Installation Foreman

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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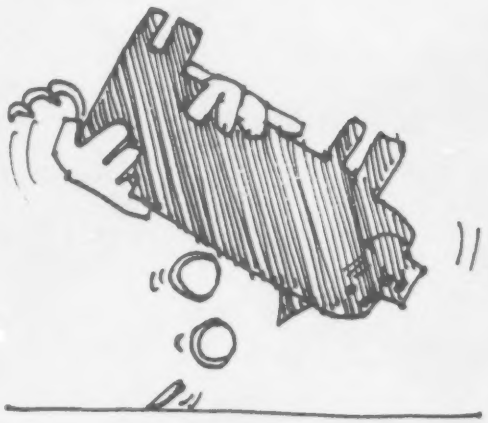
Janice Morgan

by Ruth Noyce



Interviewer: How did you happen to apply for a job with Southwestern Bell?

Morgan: After running out of money for my fourth year of college, I began doing factory work. My cousin, who was working for the telephone company, urged me to apply there for an outside job, knowing that I prefer to be outside whenever possible. (I had been a physical education major in college for three years.) I started out as an installer with Ma Bell, and worked as one for a year and a half.

Interviewer: What did you do as an installer? What kind of equipment did you work with?

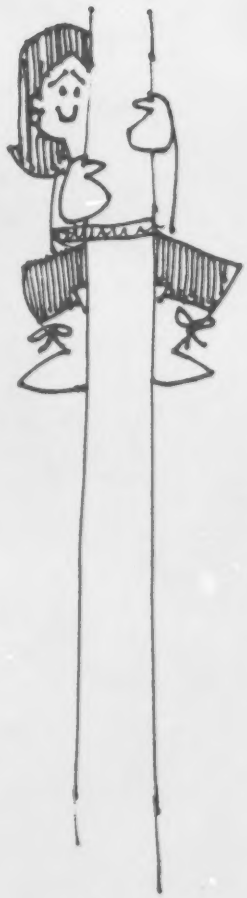
Morgan: An installer runs the wires to put in telephones. Learning to do the installation of phones was easy for me, but it sometimes became difficult outside with the weather, trees, bugs and wasps!

I had to learn pole climbing first, which introduced me to my "climbers" and "body belt." The climbers strap a spike to your feet, enabling you to dig into a pole enough to climb it. The body belt straps around the pole allowing you freedom to maneuver your body in all directions. I spent two weeks practicing in the pole barn, climbing six feet at a time until I could get myself up to 18 feet. The electricity training was the most difficult part of pole climbing school for me, though, because it was all so new to me. I really had to study.

Interviewer: You mentioned fighting the elements while working outside. Have you had any unusual experiences?

Morgan: I'll never forget my first day on the job. Since I expected to sit in the office and talk with my boss that day, I didn't dress very warmly. They sent me out immediately in what seemed like twenty feet of snow with another installer, to find a cut in a cable. I kept falling in the waist-deep snow, and had no idea what the problem was or how to fix it. I don't ever want to go through that again.

Interviewer: Did you ever have strange reactions from people whose homes you went into as an installer?



Morgan: Yes, lots of times! Husbands were invariably helping me do things because I was female. One man was in my way, wanting to do the whole job, until I finally said, "Listen, sir, I can get this done and get out of here much faster if you'll let me do it." He was shocked when I said that, but those men would put me an hour behind sometimes. With ten more orders to fill, you just have to tell them.

Interviewer: Do you belong to a union?

Morgan: During the time I was an installer, I was a union member. The union is only for craft, however, and I am now in management, which is not unionized.

Interviewer: How do you like being on the management side?

Morgan: This is quite different. When I was an installer, I only had myself to think about. If I got my own work done, I was paid and I didn't have to worry about anyone else. Now my salary is dependent upon how well the men who work under me do. If they don't do a good job, I don't get my raise and I don't get promoted. I wouldn't go back to craft, though, because my possibilities are unlimited here in management. Of course, if they tell me to go to Timbuktu to take over a crew, I will have to go, because they pay me to be at their disposal. In craft, you are independent because you have the support of the union.

Interviewer: What do you like best and least about your job?

Morgan: The part I like least, I think, is having my personal job rating determined by what my crew does. Whatever happens to me depends on them. I'm sure each foreman thinks "Mine's the best crew," and I believe that about my crew, but every crew has problems and I have my share. The best part about my job is the opportunity I have to advance if I am able to get my crew to do a good job. I can move in

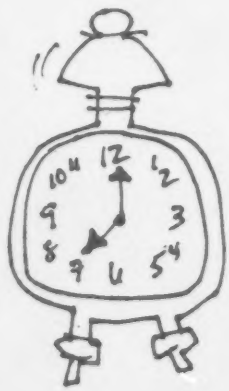
almost any direction with this company if I am successful as an installation foreman.

Interviewer: Do you have any advice for young girls who think they may want to get into management when they are older?

Morgan: Be sure to take both psychology and business courses in college, to learn how to manage people. You have to learn to deal with the people working under you. The same things keep happening but you have to deal with them in different ways each time because each person is different. The future for women in management with Southwestern Bell is bright, especially in outside jobs like mine. It is an advantage to be hired in the way I was, working outside in a traditional male job. I've advanced rapidly in management only a year and half after coming in right off the street.

Interviewer: Will you describe a typical day in your life?

Morgan: When I arrive in my office at 7:00 a.m., the orders for the day are on my desk (they come in the night before). Since my crew doesn't arrive until 8:00, I have one hour in which to straighten out anything about the orders that doesn't look right and go over the time sheets from the day before. At 8:00, I give the seven crew members their assignments for the day. Sometimes we don't have full loads for all seven, and I don't know that until I get here in the morning. I send those who don't have full installation loads to the repair dispatcher, who uses them in basic repair of coin, business, or residence phones, depending upon their training.



I try to stay in my office all morning, because the crew members usually do their hardest orders first and I want to be available to them if they need help. I spend the afternoons out in the field, inspecting the work of the various crew members and visiting with them. I am required to check the work of each crew member three times a month.

I return to my office about 4:00, finish a few reports and answer any messages. The crew members start stringing in about 4:30. We sit around and talk for awhile, leaving about 5:00, except in the busy summer months when we are often here until 6:00 or 7:00.

Interviewer: Why does your work increase in the summer?

Morgan: School's out and many people move. They re-do the insides of their homes and want new colors in telephones. I don't know all the reasons, but summer days are often seven to seven.

Interviewer: What do you like to do in your free time?

Morgan: I don't do a lot during the week because I'm usually pretty tired in the evenings. I'm not married, so I spend my time alone unless I have a few friends over or go out with them for awhile. I love to play softball in the summer. We practice one night a week and have games on Sundays. I also enjoy going out on the town on Saturday night occasionally.

Interviewer: Would you want to continue with your career if you married and had a family?

Morgan: Yes, I would, because I have worked hard to attain this position. I have observed, though, that my boss, who is married, is dedicated to her job and also raising a family. Right now marriage is not in my immediate future, however. I want to go back to school and finish my degree, which wouldn't leave much time for a family, if I continue to work full time. I'm close to completing a degree in physical education, and my employer will pay the fees, so it gives me incentive to go back to college for some night classes.

Interviewer: Do you have any other suggestions for students?

Morgan: If you like to work with people and don't have any hang-ups about it, this job is great. But people always want their phones to be working <u>right now</u>, and they don't understand there is nothing we can do sometimes. You have to be willing to deal with that attitude when you work in installation. If you don't mind doing that, and if you enjoy people, this is a good job. If you have high hopes for yourself, this is a good place to be!

CONTENT QUIZ

1. What was Janice Morgan's college major?

2. How long did Janice work as a telephone installer?

3. What does a telephone installer do?

4. What was the most difficult part of the training process for Janice?

5. Why doesn't Janice belong to a union?

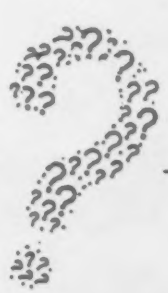
6. How does Janice spend her afternoons as an installation foreman?

7. How many crew members work under Janice?

8. Why are installers busier in summer than in winter?

9. What is Janice Morgan's favorite recreational activity?

10. What educational incentive does Southwestern Bell have for its employees?



ANSWERS TO CONTENT QUIZ

1. Physical education

2. One year and a half

3. Run the wires to put in telephones

4. Electricity training

5. She is now in management and unions are for craft.

6. In the field, checking the work of her crew members and visiting with them

7. Seven

8. People move and redecorate, which means changing telephones.

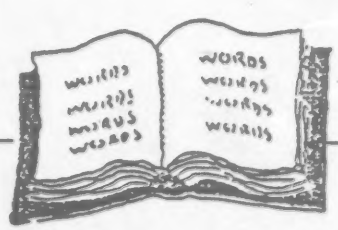
9. Softball

10. College expenses are paid for those who are completing degrees or taking job-related courses.

WORDS TO KNOW

Create your own definitions for the words below by reviewing how they are used in the context of the interview with Janice Morgan.

Word	Your Definition
installer	----------
climbers	----------
body belt	----------
craft	----------
crew	----------
foreman	----------
outside job	----------
pole barn	----------
time sheet	----------
assignment	----------
full load	----------
repair	----------
coin	----------



IDEAS FOR WRITING

1. Write a letter to your local Chamber of Commerce requesting information about the recreational activities provided in your community. Exhibit the materials you receive in your classroom.

2. Investigate the origin of softball and write a feature article about the game, in a style suitable for the sports page of a newspaper.

3. Write a description of your favorite recreational activity.

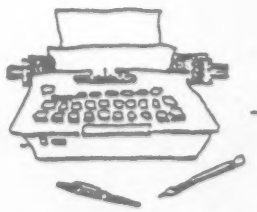
4. Write an original short story in which Janice Morgan, telephone installer, goes to install a phone where the man of the house doesn't believe women can do that kind of work.

5. Prepare a job description for the telephone company to use in recruiting installers, explaining what installers do and how they are trained, as well as the necessary qualifications.

6. Put yourself in Janice Morgan's shoes. What courses do you think she wishes she had taken in high school to better prepare herself for her job as installer? As a supervisor? Would studying science have helped her? Write all your answers to these questions.

7. Perhaps you conclude that studying more about electricity in science courses would have helped Janice in her training to become an installer. Do you think she could have anticipated in high school her future need for a science background? Write about any lessons you have learned for yourself by putting yourself in her shoes.

8. Read Donna Geisler's profile. How is her story similar to or different from Janice Morgan's story? Consider how and why they chose their current jobs, what they both do in what jobs, and their future plans they have for themselves. Write a comparison of the two, answering these questions.



IDEAS FOR PROJECTS

1. The members of Janice Morgan's crew belong to a labor union. Do you know the advantages and disadvantages of union membership? Find out all you can about American unions through (1) gathering information on Samuel Gompers, president of the American Federation of Labor (AFL) until 1924, and (2) reading excerpts from Labor on the March: The Story of America's Unions by Joseph L. Gardner and Bernard A. Weisberger (American Heritage).

2. Softball is Janice Morgan's favorite recreational activity. Make a list of the sports you enjoy participating in. Then design your personal sports collage with pictures and sketches.

3. Create a chart to record your recreational activities for one week. What percentage of your day is spent in leisure-time activities? What conclusions can you draw about your own use of recreation time? How much money did you spend?

4. Browse in your school library for books on recreational activities. Compile a selected list of books you would recommend to your friends and post the list in your classroom.

Give students a hammer, one foot ruler, and heavy rubber band. Challenge them to hang the hammer from the ruler balanced on the edge of a table, using no additional materials (such as a nail). COMETS Science's Constructions shows the solution, which demonstrates center of gravity, plus other activities which show other physical concepts used by people in construction.

Have students make an electromagnet by wrapping insulated wire around a nail and attaching the ends of the wire (with insulation removed) to a six volt battery. Find out whether the number of turns around the nail affects how many pins the electromagnet can pick up. COMETS Science's Electrically Speaking describes this and other electricity activities. Ask someone from the phone company to come to your class to tell how an electromagnet is essential to the operation of a phone.

COMETS: PROFILE

CAROL MODDRELL:
Pathologist and Deputy Coroner

Career Oriented Modules to Explore Topics in Science

THE UNIVERSITY OF KANSAS
Copyright, 1982

Carol Moddrell

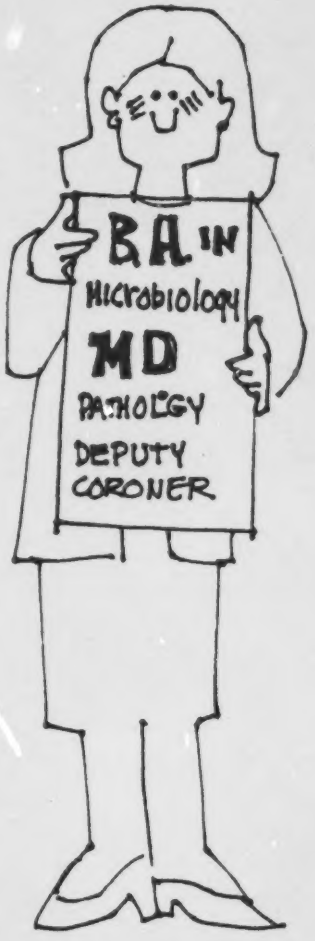
by JoBeth Allen

Interviewer: Tell me a little about your personal background, and about your early educational experiences. How did these contribute to your choosing a science related career?

Dr. Moddrell: I grew up in a large city, but now I live in a small college town where I attended the university. Although neither of my parents ever attended college, they encouraged me to do so, and I never doubted when I was growing up that I was going to. I didn't choose medicine until I was a junior in college. My husband is now in graduate school, and we have two children, Michael, nine, and Andy, 15 months.

Interviewer: You said you didn't decide to go into medicine until you were a junior in college. Did you have any leanings in that direction? Had you taken much science and math in junior high and high school?

Dr. Moddrell: I took a lot of math and always really liked it. I continued with advanced math courses in college, but began to lose interest. I didn't find the advanced courses relevant to anything, and switched my focus to foreign languages for a time. Unfortunately, the same thing happened in my foreign language courses. The further I got, the less the courses appealed to me. I liked the mechanics, structure and translation aspects. The more advanced courses were actually literature courses in a particular language. At this point, I decided to look into medical technology and laboratory medicine. I had taken a lot of biology and chemistry in high school, and I started taking interesting science courses at the university.



Interviewer: What finally led you to medicine?

Dr. Moddrell: After a couple of years, I looked around at the people in my classes and noticed that a great many were going into medicine as well as medical technology. I had no plans for marriage or any other encumbrances at the time. The prerequisites were the same for the med tech degree as for medical school, except for physics, which I took my senior year. With the coursework complete, I had only to take the medical school admissions test and to interview for admission.

Interviewer: What is the degree you hold?

Dr. Moddrell: I have a Bachelor of Arts in microbiology and an M.D. I took a four-year residency in pathology, and I'm now a pathologist working in a clinical laboratory and a hospital. I'm also the deputy coroner of the county.

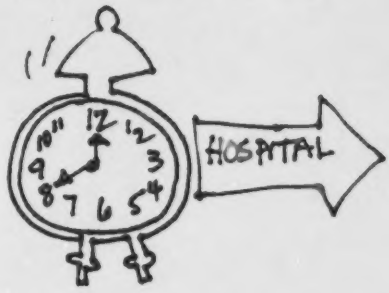
Interviewer: How would you describe your job?

Dr. Moddrell: Being a coroner only occupies part of my time. There are three of us and we rotate our duties as coroner every week. Being a pathologist is my major position. We examine every specimen that is surgically removed in the hospital. We visually examine everything from skin to appendixes and tonsils, and then we cut them into small pieces and look at them under a microscope. We diagnose whether a specimen is benign, cancerous or infectious. We also run a clinical laboratory.

Interviewer: How many people are on the laboratory staff?

Dr. Moddrell: There are thirty people working in the lab and there are two other pathologists. The three of us do the actual examination of organs, and then dictate reports on both physical appearance and microscopic details.

Interviewer: What would a typical day be like for you?



Dr. Moddrell: Let me describe a surgical week. I get to the hospital around 8:00 a.m. and am on call anytime surgery is performed that needs immediate pathological evaluation. For example, if someone has an undiagnosed mass, the doctors will remove a part of it and send it to us. We then look at it, freeze it, make a quick slide and tell them if it is cancerous or not. That way they can decide immediately, while the patient is still anesthetized, if they should remove the whole organ. About 10:30, our slides come out from the day before. We review them, dictate and sign a written report. Later in the afternoon, all the new specimens are ready for us to examine. The most important thing is keeping track of the right specimens for the right people, so that we don't diagnose cancer for someone who doesn't have it.

Interviewer: That is quite a responsibility. Do you trust yourself to do it correctly, or is it one of those things that nags at you all the time?

Dr. Moddrell: We learn to live with it because we have other people helping us. If I have trouble deciding what kind of cancer a patient has. or even if it is cancer, I can go to my colleagues and say, "What do you think?" Another thing that helps is that, on particularly difficult cases, we've been called into the operating room to see what the patient looks like. We can see what the tumor looks like when it is still in the patient, feel what consistency it is. Each of us is in on each step of the procedure, so together we can give an informed diagnosis.

Interviewer: What do you like best and least about your career?

Dr. Moddrell: I like most of it. I like administration the least, especially when we have personal problems and we have to intervene when personal interactions interfere with work. The most satisfying aspect is examining surgical specimens. There is a real sense of accomplishment when we find abnormal cells during a biopsy, and catch somebody in the early stages of cancer when treatment has a much higher success rate. I have also found that I like forensic medicine more than I thought I would. For instance, yesterday I autopsied a young man who had been shot. I had to collect the specimens, take

photographs, look at X-rays and make an evaluation so that I can testify in the trial of the person who allegedly shot him. I had to get used to what a body looked like with the life gone out of it. In the course of the investigation into why somebody died, we often find things wrong with a person that nobody suspected.

Interviewer: Was it difficult to get used to working with dead people?

Dr. Moddrell: It never really bothered me. I thought it would when I went into medical school. We had to dissect a human body the first semester, and I guess I had a little trepidation the first morning I walked in there. But from then on, it was just a question of finding this nerve and that organ and learning it. The only case that still bothers me is that of a three month old baby that died of sudden infant death syndrome. It was a perfect baby, with nothing internally or externally wrong. I found this particularly difficult, perhaps because I have young children myself.

Interviewer: Could you describe the equipment you routinely use?

Dr. Moddrell: We use a scalpel to cut the surgical specimens, and bigger knives for the larger specimens. After we get a specimen, it has to be soaked in paraffin. It then goes on a machine and is cut into very thin sections. It is those thin sections that a hystologist prepares for us and stains with different colors so we can look at them under the microscope. We learned what different colors mean and different patterns mean under the microscope during training, but the equipment is essential to make the slides. For autopsies, we have to have a special table with hoses to suck the blood out of cavities of the body. We also have saws, knives, forceps, and scales for weighing organs. There is actually more equipment in the laboratory than in pathology. There are different instruments to measure blood, centrifuges to spin blood samples down, and other microscopes to look at urine and blood. The microscopes magnify at several different levels, up to one thousand times for viewing blood smears.

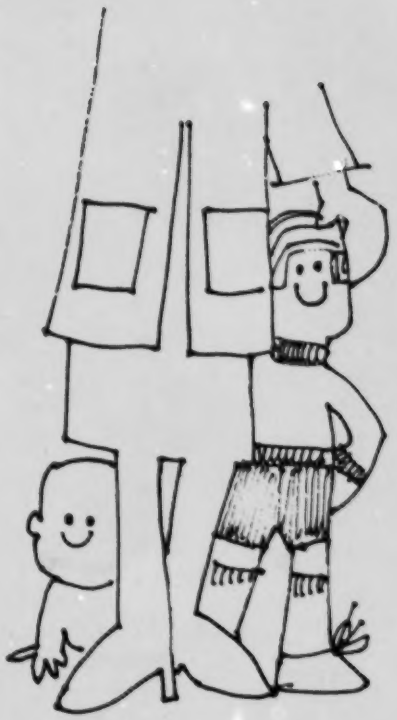
Interviewer: How much have you used concepts you learned in junior high and high school science courses in your daily work?

Dr. Moddrell: Much of what our machines do is based on elementary science principles. We use light to measure many chemical substances in the blood. Our machines have light sources; using the absorbancy of different chemicals at different wavelengths, we can determine amounts of certain substances in the blood. We use chemistry all of the time to assess how one substance reacts with another. We use physics in our equipment that counts red and white blood cells. We also use gravity and centrifugal force when we spin down lab specimens. That involves separating cells from the fluids in which they are suspended, so that we can analyze the cells.

Interviewer: How do you mix your career and family life?

Dr. Moddrell: I have been very fortunate in having good people to help in the raising of my children. My mother helped with our first son, but now we live in a different town. I found two lovely ladies through the Council on Aging

who come to our home and work around my schedule and my husband's. It is expensive, but they have taken such good care of the baby that I know he is happy whether I am home or not.



Interviewer: What about your husband?

Dr. Moddrell: He is working on a master's degree in physical education. He has always been cooperative with my long hours; I really don't have to go out much during the night. The week I am on call as coroner, I have to go out occasionally, but usually I am home with my family evenings and weekends. Most of my patients are either dead or specimens where I haven't met the person, so I don't have the mental pressure many doctors do away from work.

Interviewer: How do you see your future?

Dr. Moddrell: I'm really very happy with my position. There is such a variety of tasks that I never got bored. I spend one week doing surgicals, another being a coroner and doing autopsies, and the next doing Pap smears and working with the clinical lab. Besides our own hospital, we cover two other hospitals in nearby towns, making for a rather heavy work load.

Interviewer: What interests do you pursue when you are home?

Dr. Moddrell: I don't have nearly as much time now since I have the baby, but I love to read novels and I would be happy just to be able to sit and read uninterruptedly. That never happens! I also do needlepoint, cross-stitching and knitting, and have had a stamp collection ever since I was a little girl. But my children make it difficult to do many of these things now; even my nine-year-old wants to get in there and start licking and pasting if I try to work on my stamp collection. I do manage to get in a little television, and we do a lot of sports. My husband coached and played on a softball team this summer, and Michael played baseball, so we were involved in quite a few athletic activities.

Interviewer: Have you noticed any particular problems associated with being a woman in your profession?

Dr. Moddrell: Not really. The other pathologists here are men, and I don't have any trouble getting along with them. When I first came here, people would automatically go to the other

two because they knew them. But now there is no problem. I didn't feel that I was treated any differently in medical school, either. In fact, medical schools are now admitting 25% females; several years ago, it was only 10%. The only problem is that I do have to juggle more activities to keep up with my home and children.

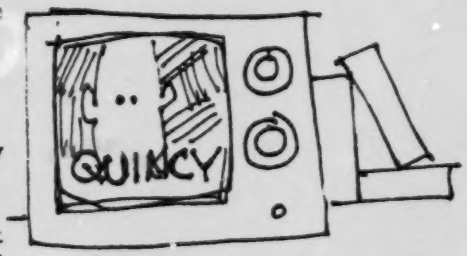
Interviewer: What is the most unusual or interesting case you have ever worked on?

Dr. Moddrell: One of the most gratifying things that ever happened was in November 1977 when the store manager of Woolworth's downtown was shot and they found his body the next morning by the railroad tracks. I was on coroner autopsy that week. I had to wait until the FBI and police were done with the body, which took about six hours. Then I performed the autopsy, including taking x-rays, removing bullets and making sure all the evidence was properly labeled. When they caught the two people who had murdered him, I got to testify at both the preliminary and jury trials. I felt like I had had a part in convicting them; it was really gratifying to have a part in that.

Interviewer: One thing that has always amazed me about physicians is that there is so much new information to keep up with. How do you keep yourself abreast of changes in your profession?

Dr. Moddrell: It is required by the state that everyone who has a medical license has to have fifty hours of continuing education per year. I get many of these hours right here at the hospital, where I attend a lecture nearly every Friday. I also belong to the American Society of Clinical Pathology. They periodically send me information on topics, with questions at the end. At the end of the year, I take an exam over all the material, and they give credit for having taken those courses. There are conventions like the one I'm going to next month, where I'll do nothing but study current pathology for four days. But it is difficult. There is so much service work that has to be completed that finding time to read is a real problem.

Interviewer: Tell me, do you ever watch the television show, "Quincy"?



Dr. Moddrell: Oh yes, I love it!

Interviewer: Do you think it gives a fairly accurate picture?

Dr. Moddrell: It's accurate. He is just overly dramatic and gets a lot more involved in being a coroner then we do. We leave the investigation to the police. Our role is to take care of the body, examine it and gather evidence, not to go out and interview people after the fact. Now we do go to the scene in some cases when the body is discovered there. We may look for pill bottles, and if there is a member of the family, we may ask for other clues, such as recent depression. But we leave the really heavy investigation to the police. Quincy doesn't.

Interviewer: Your career may not make a television script, but it certainly sounds interesting and important. Thank you so much for sharing it with us.

CONTENT QUIZ

According to some experts, remembering the facts and details in a passage can occur in several different ways. It is important to develop your skills in all these areas; this quiz will test those skills, and perhaps tell you where you need some work. Read the profile carefully, then answer the questions in pencil. Add to or correct those answers in pen after re-reading the profile. A quick check of where you have the most ink and lead will tell you your weaknesses and strengths.

Factual Recall of:

1. Details -

   a. What are the names and ages of Dr. Moddrell's children?

   b. What is Dr. Moddrell's first name?

   c. Besides a medical degree, what degree does Dr. Moddrell hold?

2. Main idea -

   a. What does Dr. Moddrell like most about her career?

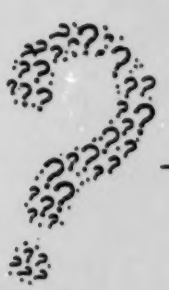
   b. Why did she choose medicine as a career?

3. Sequence -

   Suppose a patient is in surgery to have a tumor removed. Describe the sequence of events involving the pathologist.

4. Comparisons -

   In terms of undergraduate training, how does preparing for a career in medical technology compare with pre-med?



CONTENT QUIZ

5. Cause and effect relationships -

How are cells separated from the other body fluids for examination?

6. Character traits -

Beside each personality trait listed below, write if you think it is typical of Dr. Moddrell: not at all, somewhat, or very much.

a. hard working ----------

b. impulsive ----------

c. dedicated ----------

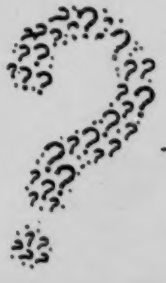
d. well-informed ----------

e. squeamish ----------

f. authoritative ----------

g. family oriented ----------

h. competent ----------



WORDS TO KNOW

1. Dr. Moddrell explained in detail what areas a doctor of pathology covers. Medicine is becoming more and more specialized. Many of the areas of specialization are probably familiar to you; others may be new. Write a brief description of each term below, using an encyclopedia or medical dictionary as your source.

   a. anesthesiology

   b. dermatology

   c. gynecology

   d. histology

   e. immunology

   f. obstetrics

   g. ophthalmology

   h. orthopedics

   i. otorhinolaryngology

   j. pathology

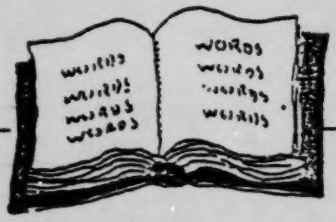
   k. pediatrics

   l. psychiatry

   m. radiology

   n. thoracics

   o. urology



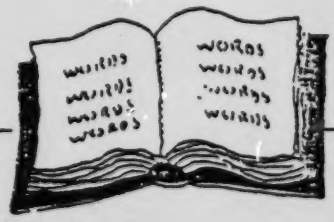
WORDS TO KNOW

2. Some words are more versatile than others. A word like "fast" can be a verb, noun, adverb or adjective. Other words can be transformed to different parts of speech with only slight changes in endings. However, there are words that can be only one part of speech, with only one definition (on the same page of the dictionary as "fast" you'll find "fatback" -a noun with one meaning). Look up the following words from the profile; read and record their variations, parts of speech and number of definitions of each, following the example:

encumbrance	syndrome
prerequisite	autopsy
coroner	assess
benign	centrifuge
colleague	physics
intervene	gratify
forensic	preliminary
trepidation	

Example:

word	noun	verb	adjective	adverb
dissect	dissection (2)	dissect (2)	dissected (1)	--



WORDS TO KNOW

3. The following paragraph is missing several words - in fact, some of the same words you looked up in #2. Now that you know something about them, try to fill in the blank with the word (in its correct form) that makes sense.

Death of a Salesman

The body lay in front of them on a long table, covered with an institutional-white sheet. The county ----------, an expert in ---------- medicine spoke first.

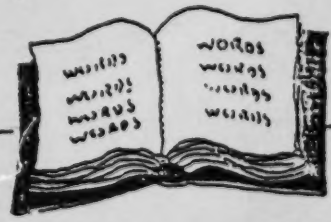
"We have completed the ----------, Sgt. Olson, but I'm still uncertain as to the cause of death. Perhaps you can help me in ---------- the situation."

Sgt. Olson answered her ----------, "I hope so; it would certainly be ---------- to solve this case. There have been so many ---------- so far, with hassles from the deceased salesman's family, the company and even the poor woman whose stairs he fell down."

Dr. Jaimes said thoughtfully, "I usually don't ---------- with policy investigation. But I did read your ---------- report, and I wonder if you've explored all possible causes. Ms. McCracken reported that the salesman fell down a long flight of stairs outside her apartment. You conclude that he died as a result of an ordinary fall-injury-death ----------. But the simple laws of ---------- point out a fallacy in this analysis. The law of gravity dictates that the victim would have suffered multiple bruises on such a long fall. Yet we found the cause of death to be one severe blow to the cranium.

Sgt. Olson mused, "Now that you mention it, there are other parts of the investigation that don't fit. Neighbors did not remember hearing a loud clattering, like a fall. They did report a lot of yelling from Ms. McCracken's apartment; words like 'obnoxious' and 'pest' were remembered."

With some ----------, Dr. Jaimes suggested, "Could the victim have been murdered? Was there any indication of a blunt, heavy weapon near the scene?"

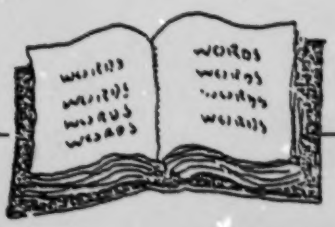


WORDS TO KNOW

Discussing the whole matter, Sgt. Olson replied, "Not possible ---------- for murder is a weapon. We searched the premises and found nothing fitting that description. The only things near the poor man were his receipt boo.. and case of goods."

"By the way," said Dr. Jaimes, "What did he sell?"

"Rolling pins," Sgt. Olson replied absently.



IDEAS FOR WRITING

1. Dr. Moddrell briefly mentions a murder case that occurred in 1977. From the information she gives, write a script for a TV show like Quincy (he is a coroner who gets involved in solving crimes, often to the disgruntlement of the police). This would be a good project to write as a team. Figure out basic characters, assign one to each writer, and let the plot evolve as you work together.

2. If you were to choose a career in medicine, what area would interest you the most? Write a letter to your parents from med school, informing them of your choice and describing the kind of training you will need.

3. Write a humorous short story (1-2 pages) dealing with what might happen if two lab tests were switched.

4. Do you think you would be a good doctor? Mediocre? Terrible? Using "Dr. (your name)," write a descrition like the one in the example.

   D edicated
   R eliable

   B usy
   O pen
   N eat
   E nergetic
   S ympathetic

IDEAS FOR PROJECTS

1. Class Project. Invite a biology teacher to dissect an animal in your class as a demonstration, or to assist you in a dissection (frogs are good for this). Using a biology chart of the animal, or an encyclopedia "internal" picture, identify as many parts of the animal as possible.

2. Small Group Project. Go to the public library and to your school library and check out some books in the juvenile section at both places dealing with medicine. Set up a medical library and:

   a. devise a system for categorizing these books for classmates.

   b. write a brief description on a note card of every book; include these in a card file under categories established in (a).

   c. create a bulletin board that will draw the interest of classmates to the medical library.

3. Individual Project. Investigate a murder that occurred in your town or one nearby. Make sure that it is a case that has already come to trial. Do as many of the following activities as possible, definitely including the first and last:

   a. Go the the public library and read every newspaper account of the incident.

   b. Interview the county coroner about the case.

   c. Interview the detective who was in charge.

   d. Write a thorough, factual report to present to your class.

Invite your county coroner to class to describe how coroners investigate the cause of death. Ask the coroner to bring a human organ or an organ from an animal like a cow to show students how the organ can be studied to learn about its problems. Kidneys, hearts, and brains are examples of interesting specimens to study. COMETS Science's Body Detectives suggests related activities.

COMETS: PROFILE

MARY MCGHEE:
Sanitary Engineer

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Mary McGhee

by Catherine Matthews and Ruth Noyce

Recently, a news magazine pictured a person deep in toxic chemical wastes and sinking deeper. Are hazardous wastes really as serious a problem as the picture depicts? Mary McGhee, Ph.D., Environmental Health Scientist and Toxics Coordinator with the Environmental Protection Agency, indicated that the problem is perhaps even more serious than the illustration portrays. Indeed the EPA maintains that the United States is generating more than 77 billion pounds of hazardous chemical wastes a year and that only ten percent of these are being handled in a safe manner.

Mary McGhee is greatly concerned about toxic chemical wastes and our environment. Mary was raised in a loving and religious Texas family and her upbringing instilled in her a desire to always care deeply about others. Her concern for others has always led her toward working in the health professions. When Mary talks about the Hooker Chemical Corporation and its irresponsibility to the people living in New York's Love Canal her voice wavers, her facial features look strained, and her actions become somewhat animated. "How could anyone knowing what they knew, knowing what was under there, give that land away and watch while the ground was broken and a school built? All those little children..." Mary gets angry! She is a scientist with a cause. . . Mary is concerned with our health and happiness.

Mary's work with EPA first involved the issuing of NPDS (National Pollutant Discharge Elimination System) permits to industries and the enforcing of water quality standards in the industrial outflows (effluents). Standards have been set for a number of chemical constituents in industrial outflows, and industries are presently required to use the best practicable control technology (BPT). As of July 1, 1983, industries will be required to use the best available technology (BAT) to control pollutants in their outflows, and industrial outflows must meet new and probably much more stringent water quality standards. Mary's position with EPA now requires that she devise a method for setting these new BAT standards. She has been working with a bioassay method (a method used to determine a certain percentage of a particular biologi-

cal population over a specific time period) and is progressing in her research to develop a method for generating the chemical concentrations that will meet new water quality standards.

Not only does Mary work as an Environmental Health Scientist at EPA but Mary is a Preventive Medicine Officer in the Army Reserves. Her responsibilities are to protect the troops by investigating the quality of their living and working environments. Mary investigates air quality, water quality, noise pollution problems, food products, solid wastes, and hazards in the work environment - the work of a true sanitary engineer.

Mary McGhee's occupation places her in unusual situations. As a sanitary engineer she is one of few women among many men. As an officer in the Army Reserves she serves with only two other women officers. She has just one woman in her unit. Mary is on a leave of absence from the University of Kansas where she is the only woman (assistant professor) on the faculty of the Engineering School.

As a senior in high school, Mary decided to marry her present husband, Flin. She had considered postponing her marriage for a college education until her parents informed her that they would not pay her way through college.

"Money wasn't a problem," Mary explained. "They paid my brother's way through his Ph.D. program. It's just that my parents didn't think girls needed a college education."

Mary chose marriage and she's convinced she made the right decision. Her husband encouraged her to attend college and she soon had a degree in microbiology, as well as a young daughter. Schooling wasn't easy for Mary, though. She started at Texas A & M the first year that women were admitted. A biochemistry instructor hid her experimental work from lab period to lab period so that she couldn't complete her assignments. A sociology professor frequently pointed out, regardless of the nature of the day's topic, that women were destined to be housewives and mothers and that they must face up to their role in society. A biology professor tried to embarrass the women in the class with lewd comments. Mary tackled each of these challenges and solved the problems in quite unique ways. She continued her studies and earned a Master's Degree and a Ph.D. in Environmental Health Science.

Mary's husband has been a continual source of support. "Pursue what you're interested in! If you want to do it, do it!" he would say. They have always shared the responsibilities for their daughter's care and all other domestic duties.

Mary is doing what she wants to do. She compares our toxic chemical waste problem to a familiar summer scene: "It's like leaving a watermelon rind on the picnic table for the next person to come along and clean up. We are responsible for what we do," she says. And Mary is insisting that "people" (industries) clean it up themselves. She is willing to provide the direction but she's not happy that most of the clean up so far has been financed by the taxpayer. "That's not right!" according to Mary.

Mary is currently working to devise a method to control toxics from a hazardous landfill which are seeping into the Sita River in Iowa. Because the ground water table moves through the landfill, Mary has decided that building a diversion channel in the bedrock and then capping the channel with a clay seal will be necessary to contain the toxic pollutants. Mary also has to set performance standards so that once the work is completed she can determine whether or not the solution is effective, based on future seepage from the landfill into the river.

Whether Mary decides to stay at a university to continue teaching Environmental Pollution Control, Environmental Law, and Sanitary Microbiology, or whether she continues at EPA with her work on toxic chemical wastes, it is certain that she will be looking after our health and our environment.

Mary has been especially inspired in her career pursuits by those people whose discoveries of vaccines, antibiotics, etc., were able to care for and cure a large number of people. She is not necessarily expecting to uncover miraculous findings, but . . . with 35,000 chemicals classified by EPA as definitely or potentially hazardous to human health. . . and with the July 1, 1985 Clean Water Act deadline for zero discharge of pollutants into our waters . . . there is certainly room for revolutionary discoveries.

The accomplishing of the goals of the Clean Water Act rests on many sets of shoulders. We are fortunate that Mary McGhee is among those searching for solutions that may someday halt the onslaught of environmental degradation.

CONTENT QUIZ

1. How many pounds of hazardous chemical wastes are generated in the United States each year?

2. What does Mary McGhee do for the Environmental Protection Agency?

3. What are Mary's responsibilities as a Preventive Medical Officer in the Army Reserves?

4. As a sanitary engineer, what aspects of the environment does Mary investigate?

5. Why did Mary's parents refuse to pay her college expenses?

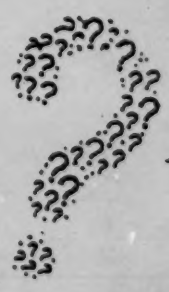
6. In what ways has Mary's husband, Flin, supported her in her professional accomplishments?

7. How is our toxic chemical waste problem like a familiar summer scene, according to Mary?

8. How does Mary plan to control the seepage of toxics from a hazardous landfill into an Iowa river?

9. What will the Clean Water Act of 1985 legislate?

10. Approximately how many chemicals are classified by EPA as hazardous to human health?



ANSWERS TO CONTENT QUIZ

1. 77 billion pounds

2. Issues permits to industries; enforces water quality standards; devises methods for setting new standards

3. She investigates the quality of the living and working environments to protect our troops.

4. Air quality, water quality, noise pollution, food, solid wastes, and hazards

5. They did not think that girls needed a college education.

6. He encouraged her to attend college and pursue what interested her. He shares the domestic duties and helps care for their daughter.

7. People leave garbage at a picnic scene for others to clean up, without taking responsibility for it themselves.

8. By building a diversion channel in the bedrock and capping the channel with a clay seal

9. Zero discharge of pollutants into our waters

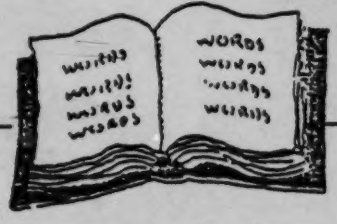
10. 35,000 chemicals

WORDS TO KNOW

As you read about Mary McGhee and her work for the Environmental Protection Agency, you were introduced to some special "energy-environment" words.

Re-read her profile, collecting all the "energy-environment" words you can find. Make your own "Energy-Environment Dictionary" by listing the words alphabetically and including a definition of each.

Your dictionary should contain at least fifteen words.



IDEAS FOR WRITING

The following materials are available free of charge from the Environmental Protection Agency:

Write a letter to the EPA requesting copies of any of the following items you would like to have. Address your letter to: Public Information Center, U.S. EPA, Washington, D.C., 20460.

Needed: Clean Air

A simplified version of the facts about air pollution. Using a cartoon character, it describes the major pollutants and the effects of dirty air on people and things. The booklet also tells how clean air can be achieved. 16 pp., illustrated, 1976.

A Book to Color - The Earth

A coloring book which offers an environmental message. 10 pp., 1973.

Fun With the Environment

An environmental activity book for children. This book offers fun and learning with crossword puzzles, fill-in-the-blanks, anti-pollution suggestions, and a coloring project. 16 pp., illustrated, 1973.

A Symbol of Hope

A small color folder which presents the Environmental Protection Agency insignia, the flower, and explains the meaning of the components which form it. 2 panels, 1972.

Common Environmental Terms

A glossary of the words used most often in discussing environmental affairs. It is designed for the student or lay person rather than for technical personnel. 23 pp., 1973.

IDEAS FOR WRITING

Our Endangered World

A simplified look at human ecology. Using a cartoon character, the booklet describes the effects of urbanization, population growth, and pollution on the world we live in. It lists steps that individuals can take within their communities to protect the environment. 16 pp., illustrated, 1976.

Noise and You

A simplified look at the effects of noise on people. It uses a cartoon character to explain sound, reception by the ear, possible harmful effects, and steps people can take to conserve hearing. 16 pp., illustrated, 1976.

Let's Dump the Dump

A simplified look at solid waste management. It uses a cartoon character to explain the collection, reuse, and disposal of wastes, and encourage sanitary landfills. 16 pp., illustrated, 1976.

Needed: Clean Water

A simplified version of the facts about water pollution. Using a cartoon character it explains the problems of obtaining and conserving clean water and suggests actions to fight water pollution. 16 pp., illustrated, 1976.

POSTERS

The Good Things In Life Belong To All of Us--Let's Protect Them
An 18 x 24 poster, depicting a tree in bright watercolor style.

Clean Air Is A Product of the United States Environmental Protection Agency
This 11 x 14 poster depicts two children playing in a field.

It's Time For the People Who Talk About Pollution to Join the People Who Are Doing Something About It.
A 16 x 24 black and white poster featuring a line drawing.

The Good Things In Life Used to Be Free
A general information folder about the Agency which opens into an 18 x 24 black and white poster. 6 panels, illustrated, 1975.

IDEAS FOR PROJECTS

1. How is solid waste disposed of in your community? Interview someone in the health or sanitation department or write to a local government official, asking these questions:

   a. What are the major disposal problems in your community?

   b. How is waste material transported to the disposal site?

   c. What happens to it at the disposal site?

   d. Are there any serious sewage disposal problems in your community?

   e. Can trash be burned for energy in your community?

2. Choose one of the following topics as the subject for a pollution poster. After gathering information, design the poster and display it somewhere in your school:

   sludge
   inversion
   automobile exhaust
   aerosol sprays
   detergents
   oil spills
   thermal pollution
   biodegradability

3. Prepare a series of three charts on water pollution, answering one of these questions with each chart:

   a. What are the causes of water pollution?

   b. By what methods is water purified?

   c. What water conservation strategies can be recommended?

IDEAS FOR PROJECTS

4. Organize a contest in your classroom to develop new uses for discarded items like bottles, plastic containers, newspapers, scraps of material, plastic straws, etc. Exhibit the junk creations in a classroom trash fair.

5. Conduct a solid waste inventory of your school and home, recording on a chart all the throw-away items you discover. Check each item you've found that might have further uses and list the uses you would suggest.

6. Survey your classmates, teachers, and family members, collecting as many ideas as possible about how to conserve water. Using these ideas, prepare a "water conservation" bulletin board for your classroom.

Boil a cup of dried grass in about a quart of water and then pour off the water. Add a generous scoup of soil to the water and keep in a closed jar at room temperature. After several days use a microscope to observe the tiny critters living in a drop of the water. COMETS Science's Fluid Follies gives more directions for this and other activities. Ask a soil scientist (call your local soil conservation agency) to come to class to talk about how pollution can be detected by what's living in the soil or water.

Cut the top and bottom out of a coffee can and mark each half inch vertically on the inside of the can. Push the can about three inches into the soil and fill the can with water. Continue adding water until no more water appears to drain immediately into the soil. Then each half hour observe how much water drains into the soil. Repeat this test in various locations to get an idea of the drainage characteristics of different soils. A soil scientist could visit with the class about uses of this "perc test" which is described in COMETS Science's Soil.

COMETS: PROFILE

GRACE KETTERMAN:
Pediatric Psychiatrist

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Grace Ketterman

by JoBeth Allen

She was the sixth of seven children. Her mother had not finished grammar school; her father had only an eighth-grade education. For eight years she attended a one-room school, learning from the older children, assisting in teaching the younger ones. After a long day at the country school, she came home to a tidy but sparse home with no electricity, running water or other conveniences. All of them worked hard to insure a productive garden and to meet Pennsylvania Dutch standards of cleanliness. Every once in a while she was able to place a treasured penny or nickle in her small, square tobacco box.

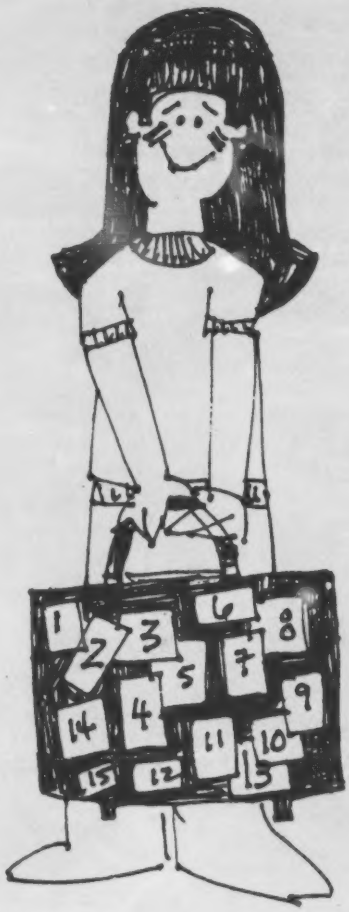
The story of Grace Ketterman's childhood could be a tale of deprivation. Grace remembers it differently. She recalls Mennonite parents who valued education highly. Her father rejected the submissive view of women, convinced that every person had a mission, to be carried out to the best of his or her ability. Grace has particularly fond memories of her father's emphasis on the values of nature. "He took time to show us how baby chicks pecked out of the shell, and how other baby animals were born. We walked through the fields to collect wild bird eggshells. He seemed to be in tune with those magical experiences that children treasure, like looking at each new rainbow." All seven children grew up with the knowledge that their father, who had wanted to be a doctor, had aspirations for his children to enter the medical profession.

With a great deal of help from older siblings and the contents of the rusted tobacco box, Grace fulfilled her father's dream. She became a pediatrician, studied psychiatry and is currently the medical director of a psychiatric treatment center for children. While her father had the most influence on her career, Dr. Ketterman remembers two other people who influenced her choice. "I had a junior high school principal who really encouraged me. It was an awful transition to go from being the only person in my grade to being one of a class of two hundred. I felt awkward, dumb, ugly, unsocialized - everything negative you can imagine. The principal somehow picked up on my ability and placed me in a gifted science class. This compliment helped me develop some self-confidence."

"We had a wonderful country doctor," Ketterman says in explaining another important person from her past. "Like many doctors, I became interested in medicine because of my early illnesses. I had a great many infections as a child, including scarlet fever, strep throat and as a result, arthritis. Our doctor was just a jewel through all those times. When I went to medical school, he gave me his little old microscope, outdated, but very precious."

Dr. Ketterman's journey from pediatrician to the director of a psychiatric treatment center for children was in part a result of her early home life. Realizing the importance of a strong family unit, Dr. Ketterman began to feel that her pediatric practice took her away from her three children too much. "I loved pediatrics, but I was weary. One week I counted one hundred hours spent away from home. Of course that wasn't a typical week; I had some meningitis cases that had to be watched constantly if their lives were to be saved. I tried taking in a partner, but all that did was double our case load." At this time, Dr. Ketterman had a fortuitous opportunity for a two-year fellowship in child psychiatry. Her studies were focused on adolescence and family life.

After her psychiatric training, Dr. Ketterman's first position was with a home for unwed mothers. It combined her interest and expertise with a flexible schedule, allowing time and energy for her own children. However, her job went through another transition in the early 70's, due to changing social climate. "The unwed mothers' scene changed dramatically in 1970. We found ourselves without enough girls who needed our services to keep our staff operating. After an intensive study of the community, we found that no one was meeting the needs of emotionally troubled girls. We elected to serve that category. As the only such agency, we ended up with the most troubled girls in a five-county area. Our clients were delinquent girls twelve to eighteen who were too severely troubled for help in foster or group care homes. Most had been through as many as fifteen prior places, including state training schools and mental hospitals.



Inadequate facilities complicated the task further. "We had no outdoor space. We had no locks, and these kids were incorrigible runners. Many were drug addicts, and we were only a hundred yards away from a large park that was the center of the local drug scene. We had little staff and less money." By 1975 both staff and facilities had become increasingly adequate. There are highly trained medical doctors, nurses, therapists and teachers. In addition to a three million dollar main building, there are three group homes, a fully accredited day school and plans for a vocational school.

Dr. Ketterman's chief role in the facility is as administrator, although she is still often directly involved with young people and families. "In a typical day," she reflects, "I meet with various staff members who want to discuss particular cases of concern. I will give suggestions

or approval, and set up further evaluation if it is needed. Sometimes I need to see the child or family myself, to get a better feel for the situation. I frequently do a physical, neurological or psychiatric evaluation myself. I also meet with staff members who have personal problems. Immense stress comes out in dealing with such sick kids; I am concerned with helping the staff stay emotionally well."

Genuine concern and caring exhibit themselves in every aspect of Dr. Ketterman's life. While some people may bring their work home to pursue between dessert and Johnny Carson, Grace Ketterman brings hers home to live. She and her husband, who is a doctor with a family practice, have had eight foster children over the past few years. "When we got to the point we were economically able to do it, we began bringing in girls with varying kinds of needs. We both felt there are so many kids with problems, and we had so much to offer. It has not been without its problems, however. There are a few scars. Our children may have felt neglected when a child with very demanding needs was living with us."

The needs of the delinquent teenagers Dr. Ketterman serves are almost always extreme. Although the causes are different, many of the behaviors are very similar. These young people - often as young as nine or ten - run away from home habitually. They usually run into extremely dangerous situations. Almost all of the kids are involved with alcohol and marijuana; often harder drugs like acid and heroin are a problem. These teens and pre-teens already have long records of stealing, shoplifting, cheating and lying. Dr. Ketterman explains that some clients may have more pronounced psychiatric or neurological problems.

"Since we have a hospital, we do receive a fair number of psychotic children. These are primarily schizophrenics, children who see and hear things no one else does. We also have what we call 'healthy neurotic' children. These are children who are anxiety ridden, have bad dreams, or may have a hand washing compulsion. Many of these kids are very aggressive, and have threatened others."

These are not hopeless situations, however. In fact, after five years of operation the facility's success rate was 75%. In some cases (such as schizophrenia), there may be a chemical treatment. Many different therapists work with the students in areas such as recreation, music and occupations. The deep mental and emotional needs that often result in dishonesty require extensive counseling. Dr. Ketterman has found her own close family background to be helpful as she models her values. "The values of parenting I grew up with are a more important part of our treatment program than all the psychotherapy from Freud to Erikson."

Erik Erikson, mentioned by Dr. Ketterman, was a famous child psychologist who believed personalities develop in stages. Dr. Ketterman's work is often based on developing a stage that has been neglected in a child. Erikson felt that children first develop a sense of trust, then personal power (autonomy), creativity and imagination, responsibility, independence, and finally integrity. Ketterman recalls, "In my past those factors worked for me and my siblings. I've tried to apply those principles here. When a little child is lonely and scared and cries and runs to daddy or mommy, and the parent responds, the child knows there is someone to depend on. From that security the child can begin to develop independence. But if the parent responds too much (overprotecting) or too little (rejecting) then the child is damaged."

"Since this security/independence development may be the core of other problems, we try to address it immediately when a child enters our care. New patients who come to our care are put in a private room, a little bit like a child in a nursery. They must ask us for anything they need for a few days. We visit them a lot, and tell them what we're there for. This way they develop a sense of trust in us, and can become more independent. When that is accomplished, they start school and social activities, and may eventually move to group homes."

Often, leaving the structure and personal attention of the institution is threatening to the youth. Some may act out by running away or smoking pot in an effort to convince people that they are too sick to leave. It is a much easier transition when there is a family that has been cooperative and is there to take the young person back. Often, that is not the case. Dr. Ketterman reviews the options: "Sometimes we get them well enough to go into a foster home if one is available. Through our group homes, we can continue to raise them to young adulthood and then go to college or job training. We work with dozens of other agencies to facilitate our children in becoming successful, independent citizens."

It is for this difficult transition area that Grace Ketterman dreams of expanding their facility. She wants to start a special, individualized vocational school. "For years I've been aware that there are many children who are not retarded, but they are not at all academically oriented. They may be talented or even gifted in areas like

mechanics, music or art. But there is no place in our school system for them, and they face failure day after day. By sixth grade, they are depressed, bored, mischievious kids. If we could get them in a school that develops their talents and interests - every child has something - we could teach them success instead of failure."

Grace Ketterman's personal success in working with troubled young people has enriched - perhaps even saved - the lives of countless newly-productive citizens.

CONTENT QUIZ

When you are reading something to learn from it, it is important to get the facts and to understand what you've read. The best readers, however, go beyond this factual level. Three skills involved in applying what is read are analysis, synthesis and evaluation. Read the profile thoughtfully, then answer the following questions. "Grading" will consist of a group discussion on differing answers, so be prepared to defend your choices.

1. Analysis: recognizing and applying rules of logic to the solution of a problem; analyzing an example of reasoning

   a. Grace Ketterman viewed her childhood very positively. Do you agree or disagree? Why?

   b. Most kids Dr. Ketterman treated used drugs. Could you say that all drug users are emotionally disturbed? Discuss.

   c. If you were Dr. Ketterman, how would you handle this situation?

      The music therapist found Mary S. to be a very talented guitar player and wants to schedule lessons every morning from 9:00-10:30. The classroom teacher says that Mary will miss reading, her weakest subject, at that time.

2. Synthesis: using original, creative thinking to solve a problem

   a. What would be a good title for Grace Ketterman's biography?

   b. What other profession might Ketterman have entered?

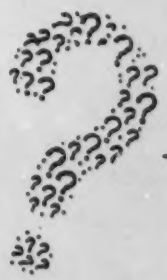
   c. How would you deal with a patient who was bothered by bad dreams?

3. Evaluation: making judgments based on clearly defined standards

   a. Would you like to have Dr. Ketterman for a mother? Why?

   b. Do you approve of the kind of institution discussed in this profile? How would you feel if your sister were sent there?

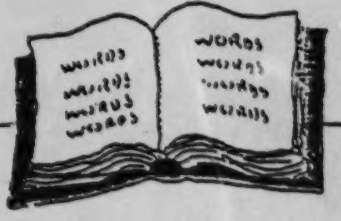
   c. Some psychologists think it is important to get a patient to talk as much as possible about his or her past history to give insight into present problems. Others feel that the problems should be dealt with directly. How do you feel?



WORDS TO KNOW

1. There are often families of words with the same root and varying suffixes. These endings tell the reader not only what part of speech the word is, but also give added meaning to the root. The root word "psyche" for example is the base of several root words. Complete the exercise below; then ponder #2.

word	part of speech	meaning
psyche		
psychiatry		
psychiatric		
psychotic		
psychiatrist		
pediatric		
pediatrician		
pediatrics		
neuron		
neurologist		
neurological		
neurotic		
neurology		
therapy		
therapist		
therapeutic		



WORDS TO KNOW

2. From your brief study of suffixes, try to generalize about what part of speech and what meaning is usually associated with the following:

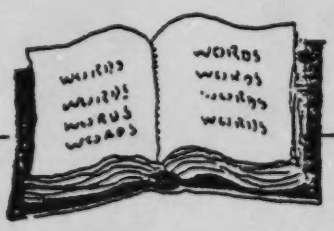
suffix	part of speech	meaning
-y		
-ist		
-ic		
-ian		
-cal		
-ology		

3. Work in groups of three on #3 and #4. Use a dictionary and a thesaurus. Look up each of the words listed below to find at least one synonym for each.

e.g. sparse — meager, lean

deprivation
submissive
aspirations
incorrigible
accredited
fortuitous
immense
delinquent
habitually
integrity
academically
compulsion
oriented

4. Go back through the profile and find where each word in #3 appears. Vote on which word, the original or one of the synonyms, you like best in the sentence. Write each sentence on a piece of paper, using the agreed-upon word. Compare your choices with other groups'.



IDEAS FOR WRITING

1. Choose one of the following topics and write a well-developed report on it. Your report should use at least three different sources (e.g., encyclopedia, library book, reference person, magazine article). The report should be 400-500 words long, with an introduction, presentation of your findings, and a concluding paragraph containing your own views on the subject.

    a. schizophrenia
    b. Erik Erikson's states of personality development
    c. Mennonites and Pennsylvania Dutch
    d. marijuana
    e. neurotic behavior

2. Use the following introductory paragraph to write a creative story. Use your imagination to write a scary, comic, tragic or even fantastic piece.

    My stomach felt like a motorcross race was being held in it. I had slept for only brief intervals; even those times were ruined with jumbled dreams. My instinct as the sun finally rose was to call my best friend Pat for advice, comfort and immediate companionship. I rejected the impulse. I couldn't give it up so soon. But I was beginning to see why they had told me so adamantly at work, "This isn't the kind of job you can take home with you."

3. Grace Ketterman was especially grateful to her father for his emphasis on nature. A Japanese poetry form, haiku, is also oriented toward nature. A haiku poem consists of a total of seventeen syllables written in three unrhymed lines. It has five syllables in the first line, seven in the second, and five in the third. It gives a brief insight into nature and is rich in imagery. After reading the following example, try your hand at this interesting link between poetry and nature.

    Shattered blue eggshell
    Nested in green and brown brush,
    Waiting to be seen.

IDEAS FOR PROJECTS

1. Class Project. Make a mural timeline of important events in medical history. Divide into three committees:

   a. The first committee will be the organizers in charge of choosing a site, deciding on which events should be included and figuring out mathematically where each event goes so that the timeline is an accurate representation (only try this from about 1500 on -it would be rather difficult to go back to 8000 BC proportionately!).

   b. Your committee is in charge of researching all the famous people or events that committee (a) decides to include; write a brief summary on a note and to place on the timeline.

   c. You are the artists; depict each person or event in a representative way on the class mural (draw rough drafts first).

   The following people and events are possibilities for inclusion.

8000 BC	Trephining (hole in skull)
2500 BC	Egyptians - systematic treatment of diseases
400 BC	Hippocrates - medicine became science
1000 AD	First university med school - Europe
1543	Versalius - scientific study of anatomy
mid-1500's	Pare' - father of modern surgery
1628	Harvey - book on blood circulation
1676	Leeuwenhoek - discovered bacteria
1796	Jenner - smallpox vaccination
1846	Long & Morton - ether, first anesthetic
mid-1800's	Nightingale - modern nursing
1865	Lister - antiseptic surgery
1895	Roentgen - x - ray
1898	Curie - radium for cancer treatment
1900	Freud - treatment of mental illness
1928	Fleming - penicillin
early 1950's	Salk - polio vaccine
1954	American surgeons - first organ (kidney) transplant.

IDEAS FOR PROJECTS

2. Small Group Project. Dr. Ketterman talked about the importance of good parental responses in helping a child develop normally. The parent should be neither too overprotective (smothering) nor too rejecting (harsh, cold). Sometimes it's really tough to know just what to do as a parent; this activity is going to give you some practice. Four members of the group will draw a card from the group leader, who will have four cards marked "Too Much," "Too Little," "Just Right" and "Kid." The rest of the group should confer, then present the four actors with a situation in which they will role play the description they draw. The group leader will determine the order or combination of players; for example:

<u>situation</u>

A four year old runs in with a hurt arm after falling off the swing set.

<u>role players</u>

"Too Much" parent, "Just Right" parent, "Kid"

<u>situation</u>

A thirteen year old bursts into tears at the dinner table after being cut from the basketball team.

<u>role players</u>

"Too Much" parent, "Too Little" parent, "Kid"

<u>situation</u>

A sixth grader is very depressed about an up-coming family move to another state.

<u>role players</u>

1) "Too Little" parent, "Kid"
2) "Too Much" parent, "Kid"
3) "Just Right" parent, "Kid"

Now work as a group to develop other situations for role play.

IDEAS FOR PROJECTS

3. Individual Project. Develop a bulletin board that teaches about diseases that people your age might contract. You might include disease (What do I have?), symptoms (How will I feel?), treatment (What can Doc do?) and preventive measures (I don't want it - what can I do?). A local pediatrician or pediatric nurse could tell you the most comon illnesses for your age group. Some possibilities are influenza, mononucleosis and strep throat. Include meningitis to learn why Dr. Ketterman's "100 hour week" was so crucial.

Have students read the "Contributions" section of each COMETS Science module. ("Contributions" start on page three of each module.) Add the contributions to science found there to the timeline made in the first activity under "Ideas for Projects." COMETS Science also has a "Bibliography of Biographies" of women in science which can suggest additional entries for the timeline.

COMETS Science's People Watchers contains directions for making a sociogram. Have students complete that activity in order to become more aware of the interactions of people. Invite psychologists, social workers, or other mental health workers to class to lead this activity and to relate how science concepts, especially social science concepts, are applied in their careers.

COMETS: PROFILE

ELFRIEDA IRVING

Supervisory Clinical Nurse

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS

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Elfrieda Irving

by Ruth Noyce

An hour spent with Elfrieda Irving is an enlightening experience! Having lived on an Indian reservation from birth to marriage, she understands what it is like to grow up Indian in America. Recently, she took time from her responsibilities as a supervisory clinical nurse for the Public Health Service to discuss her childhood and the American Indian culture. Her reflections on a variety of topics are quoted here.

Indian Tribes

Every Indian child must be registered in a tribe. Because there is so much intermarriage now among members of the different tribes, they are really getting strict about their enrollment. My dad is half Sioux and my mother is full-blooded Wichita, so my sister, brother, and I are registered Sioux. You can't get enrolled in a tribe, unless you are more than one fourth of that certain tribe, so children who are of four different tribes can't get enrolled anyplace because they are not over a fourth of any tribe.

When I was growing up, I thought all the Indians in the world were Sioux. I didn't realize there were so many tribes. We have our own culture and language; we each want to hold on to our own separate ways. There are about 150 different tribes represented at Haskell Indian Junior College where our clinic is located, and a slight difference in tribal ways creates some problems. However, most Indian students still prefer Indian friends to white ones, no matter what their tribes.

Because my husband and I both came from the same reservation, my children, who have been raised in the white world, tend to have problems in identifying. Sometimes I think they try too hard to prove that they're Indian. My son is back at the reservation working for the Bureau of Indian Affairs and my daughter is in a nursing program for Indian women. My granddaughter is registered with my daughter who is on the Wichita tribe rolls in

Oklahoma because the rules say you have to be born on the reservation in South Dakota to register as a Sioux.

Some Indian tribes are having a difficult time because their census rolls have been closed for many years. That is, they quit registering people. If you want to prove that you belong to a certain tribe, your grandparent's name must be on the rolls. Some Indians are getting down to 1/132 now and they are not eligible for Indian schools because they must be able to prove they are one-fourth Indian of any tribe.

Life on a Reservation

The reservation I grew up on is the Pine Ridge reservation - where the Wounded Knee problem occurred. Everybody was poor; there were no cars or modern conveniences and we were all alike. In spite of this, I had a very happy childhood. I didn't realize how disadvantaged I was until I left the reservation.

I was a little bit different than my friends on the reservation because I had both a mother and a father. My father worked for the government at $30 or $40 a month, so we were rich compared to the other Indian children, most of whom had only one parent. Food and clothing were hard to get, but I don't have bad feelings about that part of my life.

The Education of an Indian

When I was growing up, the children from our reservation went either to a Catholic boarding school (no tuition) or to a government boarding school. Since the children in my family were not eligible for the government public high school in town (due to some strange regulation about my father's being employed) my sister and I went to a private Episcopal high school for Indian girls on the other end of state. We went in September and didn't return home until May. Tuition was something like $25 a year, and we were considered fortunate because not many families on the reservation could afford that.

It was quite an accomplishment for an Indian to finish high school in those days. My dad was a very intelligent student - a really exceptional man - and he was offered a scholarship to go to a school in Pennsylvania after finishing tenth grade, but my grandmother wouldn't let him go so far away. She only had fourteen other children at home! Indians of my generation did well to complete high school and rarely went on to college, so I didn't have any big plans when I graduated except to get married. My mother had a seventh grade education.

Haskell is well known in the Indian world. I might have come here for the outstanding commercial course, had I wanted to become a secretary. I had no desire to enter the white world, so I decided to go to an Indian school way out in Arizona for a nursing program. I earned my RN there after three years

of hard work. Then I went back to Pine Ridge, South Dakota where I worked for two years before I married an ex-Navy man from the reservation.

Prejudice

There is still so much prejudice in South Dakota. Things just haven't changed much. I always used to think that I'd live in Oklahoma some day because it seemed so nice, when we visited my mother's people there. You could eat in restaurants and go into theaters. Even though people had trouble identifying me as an Indian because I'm fairly light, I am Indian and I was raised the Indian way. My husband and I moved to Oklahoma, where I was acting director and night supervisor for an Indian hospital for twenty years. My husband took night courses and worked his way up to be the administrative officer here in Kansas at Haskell. I worked in the city hospital operating room for a few years while waiting to get back into Indian health and then came to Haskell Health Center as soon as there was an opening.

The Public Health Service

We have a lot of programs going here at Haskell and the five Indian registered nurses are kept very busy. Treating Indian patients is quite different from treating white patients. We are trying to take a wholistic approach, thinking about where they came from and what their home life was like, because their backgrounds are quite different. Students may come in with a cut on the finger and weep all over the place because it's the first time they've been away from home. The main problem is loneliness. Quite a few of our students are from broken homes and they are mixed up because they were not raised by their own parents. Some of my generation got lost in the shuffle and took to the bottle.

Most of our students have problems of self-identification. Who is their mother? Who is their father? Why did they go off and leave them? There is so much of that among our students, and it's very sad. We nurses all take turns with the patients, screening them carefully, listening to their problems, and checking their vital signs. Our services are free to all Indians, paid for by the Public Health Service.

The American Indian Alaska Native Nurses

For several years, I thought I was the only Indian nurse in the world. There were only a handful in those days. I can remember thinking that there surely should be another Indian nurse in this world someplace!

We are now getting more educated Indian women, many with Master's and Ph.D.'s. I am president of the 375-member American Indian Alaska Native Nurses organization at the present time. Our goal is to train more Indian people to work in Indian hospitals. We have quite a few Indian Licensed Practical Nurses, but not enough registered nurses. We want our people to be cared for by Indian nurses, because it's a traumatic experience to go into a hospital not knowing a word of English, as most of our people do. This sometimes slows the healing process for them. Our organization was formed as a support group to encourage Indian women to become nurses and to stay in the profession, working in Indian hospitals.

Sioux Customs

My favorite activity is riding horses. They always say that a Sioux has horses and a dog, and is raising grandchildren. It's the same as the Navajo always having sheep. My 87-year-old father was taking care of our horses in Oklahoma, and that's what kept him going. It reminded him of his youth because he was raised with the cattle and horses.

My father also enjoyed going back up to the reservation and sitting on a corner laughing and talking with a group of other old Indian men. Indians do have a good sense of humor.

My family continues some of the old customs, especially on my mother's side. For example, my mother's sister recently had a memorial service for her son who was killed in Korea. People go and pay their respects to her for giving up this son in the war. Then, she has a give-away, with the help of her other children. They give blankets and shawls to friends in his memory. People have these give-aways with special ceremonial dances to celebrate special occasions, such as a daughter's going away to school. All their friends dance to celebrate their happiness over the daughter's decision to better herself. It isn't only when a death occurs that families have these ceremonial give-aways. It could be just because they are proud of someone and happy.

The fourth R, respect, is something I grew up with that continues in our Indian families. We have a great respect for our older people because they have that wisdom that comes from living a long life. Families stay very close.

Because it was definitely not customary for a Sioux to send his daughters away to school for higher education, my father took a lot of criticism from his own people. He was often accused of trying to become a white man. He wanted us to be educated because he knew that was a way out of poverty for us. I certainly feel the same way about my own children and grandchildren. Education is our salvation. We don't yet know what great contributions the educated Indian is capable of making to our world.

CONTENT QUIZ

Complete these statements from Elfrieda Irving's profile by filling the blanks:

1. You can't get enrolled in a tribe unless you are at least _____ of that heritage.

2. There are _____ tribes represented at Haskell Indian Junior College where Elfrieda's clinic is located.

3. Elfrieda and her husband come from the same large reservation in _____.

4. A three-year program in an Arizona school after graduation from high school prepared Elfrieda for a career in _____.

5. While growing up, Elfrieda preferred life in the state of _____, because Indians were welcomed in restaurants and theaters.

6. Many Indian students have _____ problems, according to Elfrieda, because they are from broken homes.

7. Elfrieda and her staff serve all Indians free, their services paid by _____.

8. The Indian nurses association of which Elfrieda is president is named _____.

9. They always say that a Sioux has a _____ and a dog.

10. The respect of older people in the Indian families is known as the _____.

ANSWERS TO CONTENT QUIZ

1. One fourth
2. 150
3. Pine Ridge, South Dakota
4. Nursing
5. Oklahoma
6. Self-identification
7. The Public Health Service
8. The American Indian Alaska Native Nurses
9. Horses
10. Fourth R

WORDS TO KNOW

1. Find an appropriate dictionary definition for each of these words used in Elfrieda Irving's profile:

reservation _____

census _____

clinical _____

tribe _____

prejudice _____

wholistic _____

self-identification _____

_____

traumatic _____

2. Where do you think these expressions used by Elfrieda originated? You may need a slang dictionary for some of them.

boonies _____

RN _____

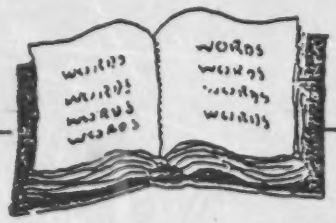
lost in the shuffle _____

took to the bottle _____

fourth R _____

took a lot of flack _____

become a white man _____



IDEAS FOR WRITING

1. The book Annie and The Old One by Miska Miles (Little, Brown, 1971) tells about a young Navajo girl's love for her grandmother. After reading it, write an explanation of the meaning of the "Fourth R" in that Navajo tribe.

2. Think about Elfrieda Irving's statement, "Education is our salvation." Write a paragraph expressing your own point of view about the importance of educational opportunities to the American Indian.

3. Read Bury My Heart At Wounded Knee by Dee Brown (Holt, Rinehart and Winston, 1970). Write a summary of the major problems being faced by the Indians at Elfrieda Irving's Pine Ridge, South Dakota reservation at the present time.

4. How does the description of the "long walk" of the Navajos presented in Bury My Heart At Wounded Knee by Dee Brown (Holt, 1970) differ from the one in Scott O'Dell's Sing Down The Moon (Houghton-Mifflin, 1970)? Write a comparison of the two.

5. Do the Indian children growing up on a reservation in America and the black child living in the inner city face similar problems? What career options seem to be most available to each? Write an essay comparing their situations in our society.

IDEAS FOR PROJECTS

1. What are the chief functions of the Bureau of Indian Affairs? Find out all you can about the organization and prepare an informational brochure for your classroom.

2. Research the "kachina", a symbol which has spiritual significance to the American Indian. Prepare a bulletin board display for your classroom, telling the "kachina" story and showing examples of various kinds.

3. Select one group of American Indians and study their art and culture. The books in Shirley Glubok's "Art of . . . " series are excellent sources:

   THE ART OF THE NORTH AMERICAN INDIAN (Harper, 1964)

   THE ART OF THE SOUTHWEST INDIANS (MacMillan, 1971)

   THE ART OF THE NORTHWEST COAST INDIANS (MacMillan, 1975)

   THE ART OF THE PLAINS INDIANS (MacMillan, 1975)

   THE ART OF THE WOODLAND INDIANS (MacMillan, 1976)

4. Read some poetry written by American Indians and try to discover its special characteristics. Start with Byrd Baylor's The Way to Start a Day (Scribner's, 1978), Hawk, I'm Your Brother (Scribner's, 1976) and The Desert Is Theirs (Scribner's, 1975). Then read Our Fathers Had Powerful Songs by Natalia Belting (Dutton, 1974) and/or Shaking The Pumpkin by Jerome Rothenberg (Doubleday, 1972).

5. The book American Indian Women by Marion E. Gridley features biographies of eighteen women, both historic and contemporary. Choose one of these women and compare her life experiences to those of Elfrieda Irving.

Ask a nurse to come to your class to describe careers in nursing. The nurse might begin the classroom visit by showing students how to take their pulse and/or by demonstrating examples of circulation in other animals. See COMETS Science's Fit N' Trim and Healing Techniques for ideas about circulation and other activities which a nurse can relate to a career in nursing.

COMETS: PROFILE

GENEVA HAMMAKER:
Chemist

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
Copyright, 1982

Geneva Hammaker

by JoBeth Allen

They haven't needed an alarm clock for twenty years. In the early years, when Lucy and Barry were babies and pre-schoolers, the alarm was a hungry cry, cartoons blaring or "The cornflakes are all gone." Now it's the dogs, those irritating but irreplaceable pets who never seem to be on the right side of the door. Even without the insistent animals, Geneva Hammaker would be up by 7:00, relying on an internal alarm that has signaled her with that I-can't-stay-in-bed-any-longer feeling for so many years. Today daughter Lucy is away at college, so it is just son Barry and "Mom and Dad" (Geneva and Bob) creating the organized chaos of a morning in the Hammaker house.

"Everyone is on a different schedule, so we all get our own breakfasts," Geneva reports. "The first person up goes to get the paper and then leaves it there covered with jam for the next person. When Bob has a 7:30 class to teach, things are a madhouse. We just try to stay out of his way. Barry leaves for high school at 8:00. My work hours are officially 8:00 to 5:00, but the company is very lenient, so I get to work between 8:00 and 8:30 most days. By the time I leave the house I've already started a load of laundry, which of course means transferring (to the dryer) the wash that I left there the night before. As I walk out the front door, the washer, dryer and - if I'm really efficient - the dishwasher are all running and the animals are gobbling from their assigned bowls!"

Combining a successful career with a cohesive family life is a challenge more and more men and women are accepting. There has been a healthy move on the parts of both sexes towards a view of adulthood that encompasses relational as well as professional goals. Rather than the traditional comments of "I'm going to be a doctor," and "I'm going to be a wife and mother", children of both sexes are more likely to say "I'm going to be a doctor and a parent" or "I plan to become a carpenter, but a good marriage is also important to me." The Hammaker family provides an excellent example of how successfully these dual goals can be pursued.

Geneva Hammaker is a research scientist with an international consulting firm, Developmental Planning and Research Associates. Her background includes a Ph.D. in chemistry and several years of teaching high school and college science courses. Bob Hammaker is a university chemistry professor. They met in graduate school, where the first adjustments between careers were necessary. "Bob finished a year ahead of me, and accepted a job with Texaco. I stayed behind to

finish my degree. We didn't realize at the time how modern we really were." When Bob accepted a teaching position at a major university, the Hammakers ran into a problem. At that time, in many colleges, husbands and wives could not teach in the same department, at least in a professional position.

Geneva explains how she resolved the problem: "Those were the years when I was having babies, and it actually worked out well to have a parttime, flexible employment. I was able to teach in the chemistry department as a parttime instructor, and later I was a faculty member at a small college about sixty miles away. I did have to be patient about developing my career, but I felt it was equally important to have flexible hours when my children were very young. As it turned out, all of my varied experiences have been valuable for my present position. It was just that, at the time, I often felt like I was floating along, doing whatever seemed interesting on a short term basis, never really concentrating on one area, becoming an expert."

The dilemma Geneva described is faced by many people as their careers develop. Some people know exactly what they want to do, and set a straight course in that direction. They often become respected as "experts" on a particular subject. Others find themselves interested in so many things that they seem constantly to be exploring new directions. These people may not be expert in any one area, but often have very broad knowledge. Ms. Hammaker advises young people who are thinking about careers, "Give some conscious thought to what you really want to do. Set priorities. Concentrate, not only on your work, but on your play. It is important to have goals, although with those goals people can still be flexible enough to take advantage of different opportunities. It's impossible to look down the road ten years and say exactly what would have been the best choices. I just don't know, even now, if it is best to specialize or to 'float'."

Such difficult career decisions are complicated further if couples decide to become parents. Bob and Geneva have been very committed to their family unit, and have worked to balance professional and family time. Their daughter, Lucy, is a college freshman; son Barry is a junior in high school. They are very self-sufficient now, but such has not always been the case. "When the children were young, we were very fortunate in having a woman who took care of them and the house. I think that is a must in a two career family. She kept the house in better shape than it has been ever since, took excellent care of the children, and even started dinner. She provided many educational and entertaining opportunities for the children; I really feel they benefitted from her." Not everyone can find (or afford) this kind of help, however. Many young couples rely on grandparents, day care centers and babysitting co-ops. Others work out flexible schedules so that Dad parents while Mom works and vice versa.

The Hammakers had very different parents themselves; they have speculated about how their childhoods have affected them as parents and as professionals. Geneva remembers, "I grew up on a farm and attended a one-room schoolhouse. In fact, I can trace

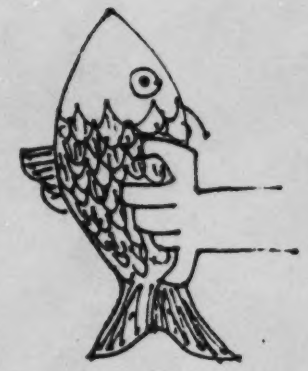
my interest in problem-solving to those days. As a fifth grader, I would watch the eighth graders working problems at the board. I'd sit there working the same problems at my desk, thinking 'I've got to beat Ralph!" My parents were not college educated, but were supportive of my decision. They certainly didn't push me in that direction, though." Bob's background was quite different. Both his parents and his grandparents were college graduates. His father was a business executive, and his mother was a housewife who always had hired help. "As a result," Geneva points out, "Bob did not ever see a father actively engaged in either housework or parenting. It has been fascinating to watch the transformation."

Barry and Lucy had had the benefit of models who actively parent and work. "I'll bet," Geneva predicts, "that our son will be an active parent, if he ever gets around to marrying and having children. I really see teenagers looking carefully at our lives, and pulling the best from a variety of situations they see." She has already observed this process in her own children. "I think we are rearing children who are going to take a long hard look at career pressures in terms of setting their own lifestyles. My son has lectured me with, 'Don't you think you are spending a lot of hours over there?' We were always very careful to set aside time for our children - Saturdays were totally their days. But I think they may be looking at us and saying, 'But what about time for yourself, time just to enjoy life?'"

Good question. Do the Hammakers take time to "enjoy life"? "We enjoy picnics, outdoor activities, going to the lake, an occasional movie. We also are avid basketball fans. Bob has only missed two or three games since he started teaching at the university. I usually go, although in recent years I've had to fight Barry for that extra ticket!" Geneva enjoys jogging, the university noon excercise program, needlework and especially reading. "I get so involved in a good book that I do nothing - including eating and sleeping - until it is finished. My poor family can be starving and I'll say 'You're hungry? Well find something to eat!'"

Bob and Geneva are obviously interested in what effects their lives will have on their children's lives. They may find different patterns. "Lucy is in pre-pharmacy," Geneva reports, "and is quite definite about what she wants to do. She has worked in a pharmacy, and plans to work in the hospital phar-

macy this summer. Barry is a real outdoors person; he loves to fish, and has been very interested in archeology. I wouldn't be surprised if he bummed around for a couple of years, trying different things, before he settles down into a profession."



The Hammakers openly encourage their children to develop their own interests, and have not pushed them toward college or any particular careers. Geneva explains that this philosophy is based in part on some of her early college teaching experiences. "There was a boy who came in one day, wearing a slide rule that must have been two and a half feet long. He was under terrible pressure, because his father had decided he should be an engineer, with no regard for his opinion. He was miserable; there was no way he could even think objectively about a career in engineering at that point. Another student I had was at an all-girl Catholic college. There were several physicians in her family, and they all expected her to become a doctor. She had many talents, but chemistry was not one of them. When the dean called me in to question the 'D' I had given the student, I had to explain that she had barely gotten the 'D'. As it turned out, she was not only interested in but talented in drama and creative writing. Fortunately, she overcame the family pressures and found a way to excel on her own."

Geneva and Bob Hammaker have presented their children with models of active, involved parents and competent professionals. It will be interesting to see, as they have noted, which strands of adulthood they pick to develop their own lives.

CONTENT QUIZ

An important skill in successfully combining family and career is organization. People need to work out (and then remember) who does what and when. Test your mental organization by answering these questions about the sequence of events in the profile.

1. Which child was born first?

2. Which Hammaker received the first Ph.D. in chemistry?

3. Does Geneva feel that an adult's children or parents have the most influence on him/her as a parent? Why?

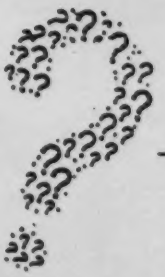
4. Describe the sequence of career/family emphasis in the three generations of women discussed in the profile.

5. Describe the sequence of career/family emphasis in the three generations of men discussed in the profile.

6. List five activities, in order, that Geneva engages in between 7:00 and 8:30 each work day.

7. Think about the issues involved in sequencing your own life. Based on your opinions and plans at the present time, make a timeline for your adult years. Consider (although you don't need to include any point that doesn't fit your plans) the following points:

high school	children (0-?)
college	spacing of children
graduate school	marriage
training program	extensive dating
work experience	travel
professional advancement	service



ANSWERS TO CONTENT QUIZ

1. Lucy

2. Bob

3. Parents; they serve as models

4. Grandmothers: no careers, active parents
   Mother: parttime followed by fulltime career, active parent
   Daughter: planning for full time career; we don't know about family plans

5. Grandfathers: full careers, little to no parenting
   Father: full career, somewhat active parenting
   Son: perhaps less involved in career, predicted to be an active parent

6. a. Gets out of bed
   b. Reads paper while eating breakfast
   c. Puts wet clothes in dryer
   d. Puts dirty clothes in washer
   e. Starts dishwasher
   f. Feeds animals
   g. Leaves house
   h. Arrives at work

   (Accept any five in correct order. Items b, e, and f may occur in slightly different positions.)

7. Varied answers

WORDS TO KNOW

VOCABULARY WORDS

avid
chaos
competent
co-ops
conscious
consulting
dilemma
dual
encompasses
irreplaceable
insistent
international
lenient
priorities
professorial
relational
self-sufficient
traditional
transformation
varied

1. Decoding. The following activities will help you in pronouncing (decoding) the vocabulary words.

   a. List each word in the appropriate column.

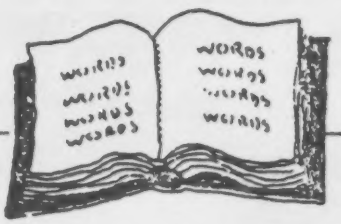
Number of Syllables				
one	two	three	four	five

   b. List the eight words that have a long vowel sound (e.g. a as in ape, i as in ice).

   1.
   2.
   3.
   4.
   5.
   6.
   7.
   8.

   c. List the words that have suffixes and/or prefixes as in the example.

	prefix	root word	suffix
ex.	inter	nation	al



WORDS TO KNOW

2. Comprehension. The following activities will help you in understanding the meanings of the vocabularly words.

   a. Write the word from the vocabulary list that could be a synonym, as it is used in the profile, for each word listed.

unique_____
demanding_____
disorder_____
easy_____
includes_____
interpersonal_____
accepted_____
double_____
worldwide_____
asking_____

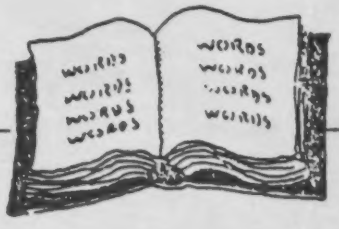
faculty_____
assorted_____
problem_____
aware_____
important ideas_____
independent_____
exchanges_____
change_____
eager_____
skilled_____

   b. Choose one of the adjectives from the vocabulary list to describe each of the words in this list. More than one answer is possible.

_____ surgeon
_____ painting
_____ basketball player
_____ parents
_____ star
_____ values
_____ menu

   c. Using the title "Panic on Seventh Avenue", write a family situational comedy incorporating these words. This should be a one-page story.

chaos
avid
priorities
dual
lenient
insistent



IDEAS FOR WRITING

1. Talk with both parents, if possible, about their feelings and opinions on combining families and careers. If a parent is not available, find a relative, friend or teacher of the same sex and approximate age to talk with. Write a first-person ("I feel that . . .") account for each parent or adult. Combine all these reports for your class to form a notebook, so that others can compare the views of various adults.

2. Assume that you are between 18-25 years old. You have been dating a wonderful person, who unfortunately has moved across the country to take a job. Write a letter proposing marriage to this person. In it, explain your personal feelings about marriage, careers, and children.

3. Choose one of the following topics and write a basic five-paragraph theme (introduction, three paragraphs developing the idea, conclusion).
   a. The ideal father
   b. The ideal mother
   c. My goals as a parent
   d. Why I don't want children
   e. How I'll spend my "free" time as an adult

4. Write a commercial (60 second) for a household item usually sold by a woman, using a man instead (e.g., kitchen cleanser, detergent).

IDEAS FOR PROJECTS

1. Class Project. Explore different family units by interviewing several adults. Discuss as a group what categories might be the most interesting to compare. One possible approach might look like this:

	Children	No children
One parent		
Two parents working		
One parent working/one home		

Another possibility might be to look at variations among professions:

	Children	No children
Part time jobs		
"9-5" jobs		
Extensive time jobs		

After class members have interviewed 3-5 adults in each category, analyze your findings and draw conclusions. Summarize the findings on a classroom bulletin board.

2. Small Group Project. Write up a short questionnaire over "plans for adult life." Include questions that have been raised through your reading and activities in this profile. Talk with your principal and/or other teachers about giving the questionnaire in at least two classrooms (e.g., 1st and 8th, or 6th and 12th). Compare the information for each question, and present a report to the classrooms that took part in your project.

3. Individual Project. Create a large collage of pictures featuring people in non-traditional roles. Look in magazines and newspapers for males and females in both occupational and social settings.

In a shallow container (e.g. the top of a fast food restaurant styrofoam sandwich container), mix ½ teaspoon salt, ¼ cup white glue (e.g., Elmer's Glue®), and 1/2 cup liquid laundry starch. Stir for 30 or more beats and then knead it by hand. The resultant "Glurch" bounces, stretches, tears and does a number of other fascinating things. COMETS Science's Product Improvement describes this and other activities which can be used by chemists or chemical engineers to interest students in their careers.

COMETS: PROFILE

DONNA GEISLER

Engineer

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS

Copyright, 1982

Donna Geisler

by JoBeth Allen

It is 1:23 A.M. at Metropolitan Hospital. Eight-year-old Jeffrey Adams has been rushed to the emergency room in critical need of three pints of AB negative blood. The emergency room physician checks existing supplies, ascertains that there is no AB negative on hand and hurriedly picks up the phone to check with neighboring hospitals. She is shocked to find the line dead. An orderly is sent to report the telephone failure. The physician turns her attention to Jeffrey, who must have more blood within the hour if he is to survive.

Donna Geisler receives an urgent call from an orderly using a pay phone outside Metropolitan Hospital. She evaluates the situation, and begins a series of critical decisions which must result in the restoration of service to the hospital within fifteen minutes. Her knowledge of complex equipment leads her to a machine that automatically prints out an error report, pinpointing mechanical failures. Geisler must then decide if the malfunction can be corrected immediately. If not, she must mobilize resources to set up an emergency system at the hospital to facilitate communication until the mechanical failure can be rectified. Whatever the decision, it must be made swiftly and followed through to assure the hospital of service by 1:38 a.m.

Ms. Geisler (pronounced "geese-ler") is an engineer for Southwestern Bell Telephone Company. Her role as District Supervisor, Network Planning involves many top-level situations like the emergency above. She is the "supervisor" with whom everyone wants to speak when the problem is so involved or critical that the patron must be sure of an informed response. If service is cut off to a business whose pulse beats through telephone lines, if there is an "executive complaint," or if other channels have been explored and rejected as solutions to a problem, Donna Geisler takes command.

While these crisis situations are a fascinating part of the job, Geisler's typical day involves much less excitement. Donna describes her usual routine: "I come in and work on the budget for the state, which is over two hundred million dollars for investment alone. On specific days, I get computer reports like 'mechanized force count' of the previous month's figures, to aid in force planning. Someone is always needing some pertinent fact about one phase of the business, so I get with other supervisors and lay out what is needed, the time frame, and coordinate the activities."

The tremendous responsibility of her job is one of the most rewarding aspects for Geisler. "When I was only twenty-six, with four years' experience with this company, they entrusted me with managing twenty million dollars. That amount of responsibility was overwhelming for awhile." To prepare her for such managerial duties, Southwestern Bell provided training in many different areas of their system. Geisler has worked as an engineer for small systems, as a statistician, analyst and planner on the budget. She worked for a time in central office engineering, which provides switching systems for entire cities. "I normally rotate at least once every year to another group to gain more experience," Geisler explains. "If you are to be an effective manager, you have to have a base to build on." She points out other advantages of this system, such as not becoming bored with one job, getting to know the people in different sections, and increasing credibility as a supervisor.

In addition to her on-the-job training, Geisler prepared herself for her highly technical work by concentrating on courses in science and math from junior high through college. It was in junior high that Geisler recalls taking an aptitude test. "I found out that my highest aptitude was mechanical, and then scientific. I had always been a tinkerer, running around with my two older brothers, helping my dad work on cars or farm equipment." This inclination influenced her choice of courses. Donna remembers being the first girl at her high school to take drafting, an interest that not only lasted through three years of high school, but helped finance her college education.

Donna credits junior high and high school counselors with encouraging her to pursue her interests in math and science. "If you do well in those fields, then you usually go into pre-med or one of the science curriculums," she notes. "I kind of had a role model in my older brother, who majored in chemistry and got a Master's in biochemistry. I didn't like chemistry as well as he did, so I chose math." Besides her Master's Degree in applied mathematics, Geisler has many hours in physics, calculus and chemistry. The core of all these courses, and of her training overall, is a very scientific approach to problem solving.

This problem solving ability was what Bell was interested in for its future managers. The standards of the company are very high, as Geisler reports. "The company does not hire anyone with a low grade point average. If I had not had a high grade point and if I had not been active in organizations to show that I had some leadership potential, I would not have been interviewed seriously." These high standards are justified by excellent opportunities for advancement within the system, especially for women.

The advantage of being a woman in big business over the past few years has been largely due to a mandate from the federal government to end sexual discrimination. Geisler points out, "They are offering men jobs as operators, and letting women have chances to install phones and climb telephone poles. They are taking qualified college graduate women into the engineering fields and training them to be managers." She is impressed with the company's fairness, because they continued to make the effort to keep equitable percentages even after the government controls ended.

One area where Geisler feels women may not be as well prepared as men is mobility. "You have to be prepared to move around if you are in a large corporation. This company could send me to St. Louis, Chicago, Dallas or New York. A lot of women just haven't been brought up thinking about having to move. We are not programmed that way -- men are. But there is no reason why we can't be mobile.

The whole matter of success in business is one that has received a great deal of attention in Donna's thinking recently. "What do you call success? Will you be successful if you make so much money per year? If you are at a certain level in the company and a highly respected citizen in the community?" While she doesn't have an answer to these questions yet, Donna knows that for herself, it is important to push, to reach as high as she can.

Listening to Donna Geisler talk with such enthusiasm and dedication about her job could lead someone to think that she does nothing but work. Actually, she has many leisure-time activities. She jogs regularly with eight of her co-workers, male and female. Anyone with a desk job has to worry about getting enough exercise; Donna stays fit in a variety of ways in addition to running. "I'm heavily into racquetball and tennis, and usually play softball in the summers." She is still a tinkerer, and works on her own car. Along with working in her yard and listening to music, Geisler finds time to volunteer assistance in the local United Way and Junior Achievement organizations.

Another impression one could get from Donna is that her job is all high points. She corrects this impression by saying, "Perhaps what I dislike the most is that occasionally you have to discipline people and sometimes fire people. I didn't really have the training in college to prepare me for that aspect of business, although we have courses here within the company that teach management philosophies and approaches."

Geisler also tries to dispel the myth of occupational utopia: "I had an idealistic attitude that I would find a job that I would be 100% happy with all the time, and I've now come to the conclusion that there is no such job. But if you find a job where you like it more than you dislike it, maybe that's the most you can expect out of life."

This realistic advice is one of several points Geisler offers young people trying to choose a career. "You need to set a goal early," she emphasizes. "It's important about the junior high age to keep in mind that you need a good background if you are going to college. If you are leaning toward engineering or math/sciences, you need to take all the algebra, chemistry and biology that you can." Counselors can be very helpful in this planning, as well as in career choices, as Geisler's situation illustrates.

What does the future hold for women who do choose a career in math and science-related fields? "I think women in the sciences will continue to have a good chance, although you have to look at the economy to know what fields might be best. We'll be stepping up oil research, getting into solar energy. I think any technical field would have to be in the boom business." Again, the important point for someone interested in one of these areas is pertinent training in school.

It is 1:36 A.M. at Metropolitan Hospital. Type AB negative blood from a bank at City General is renewing the life of Jeffrey Adams. The last thing on anyone's mind (except Donna Geisler's) is the telephone system, which is now working as usual. Donna is a woman who can handle life and death responsibilities!

CONTENT QUIZ

Reading Between The Lines

The skill of "reading between the lines" (or making inferences) is one that is important to develop. Everyone gets a slightly different impression from reading a passage; however, it is necessary to distinguish between "correct" inferences (those that come from the text) and "incorrect" inferences.

The following pairs of inferences contain one correct and one unlikely assumption, based on the profile. Underline the more likely one. On the blank line, write another <u>possible</u> statement which you infer from reading the profile.

1. **Jeffrey Adams' injury was on the playground.**

   Jeffrey Adams' condition happened or worsened at home.

---

2. **Donna Geisler works 24 hours a day.**

   Donna Geisler has a business line at home for emergencies.

---

3. **Donna completed college in the usual amount of time.**

   Donna took twice as long as usual to complete her college education.

---

4. **Most of the managers at Southwestern Bell are women.**

   Most of the managers at Southwestern Bell are college graduates.

---

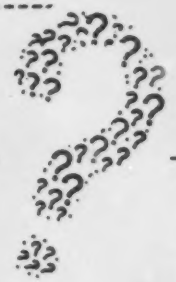
5. **Geisler defines success in terms of personal and relational goals.**

   Geisler defines success in terms of professional goals.

---

6. **Donna was greatly influenced by other women with careers in math.**

   Donna was greatly influenced by men with careers in math.

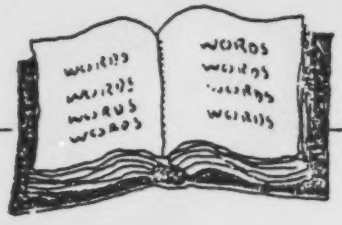


WORDS TO KNOW

1. There are several words in this article that may be new to you -- or are they? Look closely at these words. Some contain words you know; others, parts of familiar words.

New Words	Familiar Words	Possible Meanings
malfunction	function	
critical	crisis	
managerial	manage	
technical	technique	
aptitude	apt	
mandate	mandatory	
mobilize	mobile	
seniority	senior	
idealistic	ideal	
metropolitan	metropolis	

2. After you have thought of possible meanings for these new words, check with your dictionary to see if you are right, and to learn more about these words.



WORDS TO KNOW

3. Many times unfamiliar words are explained by the sentences containing them. For example, if the sentence reads "She spread the spicy, yellow glibox on the hot dogs" you can gather that glibox and mustard have great similarity. There are several words in the profile that can be figured out by using the surrounding context.

Find the words listed below in the profile. Write the sentence in which each is found, substituting a word (or words) that you feel means the same as the word from the list.

a. ascertains . . . . . EXAMPLE: The emergency room physician checks existing supplies, finds out that there is no AB negative on hand and hurriedly picks up the phone to check with neighboring hospitals.

b. restoration

c. facilitate

d. rectified

e. fascinating

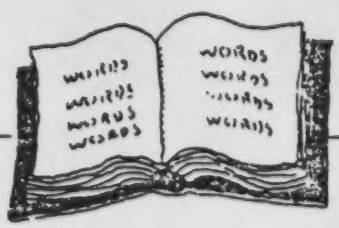
f. pertinent

g. potential

h. preferential

i. utopia

j. equitable



IDEAS FOR WRITING

Job Descriptions:

"I had an idealist attitude that I would find a job that I would be 100% happy with all the time. . ."

1. Describe the job or career that seems the most appealing to you right now.

2. Taking into consideration all your pros and cons, write a job description for yourself that comes as close as possible to "occupational utopia."

Letter:

Try writing a letter "home" as Donna might write it. Include what she would find important to talk about, in language you think she would use.

Newspaper Story:

Write a newspaper report of a terrible subway disaster, using as many of these words as you can:

malfunction	mobilize
technical	aptitude
seniority	critical
mandate	idealistic
managerial	metropolitan

Comparison:

Read another COMETS PROFILE and compare that person's education and personal background with Donna's.

IDEAS FOR PROJECTS

1. Analyze the career which seems most appealing to you by doing at least two of the following:

   a. Talk to someone in this profession.

   b. Read a biography about someone in the profession.

   c. Obtain information on the career from the career consultant or guidance counselor in your school.

   d. Using the Reader's Guide at the library, locate and read two articles on this career.

2. List five pros and five cons <u>for you</u> if you were to choose the career you have described. (This helps you in making good decisions.)

Pros	Cons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

3. Tinkering

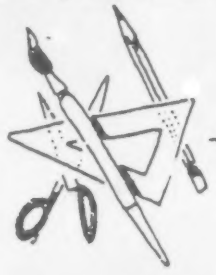
   Choose an item to take apart, such as a clock, toaster, radio, etc. Obviously you'll want to choose something no one needs, unless you are as good at assembling as disassembling!

   a. What is it?
   b. In what way did it malfunction?
   c. Name all parts you know.
   d. Draw a diagram of how the parts fit together.
   e. Describe what you think made this item work.
   f. Choose one of the following activities:

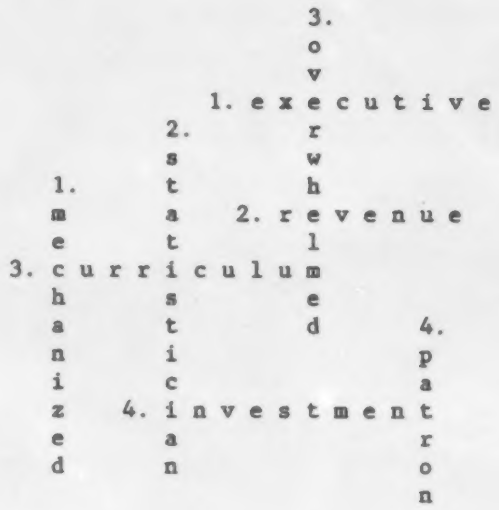
      1. Put the item back together.

      2. Use the encyclopedia or other resources to gain extra information on what makes the item function. Report to your class.

      3. "Invent" a better one. Apply for a patent.



4. **Reverse Crossword Puzzle**



The words in this "reverse crossword puzzle" are from the article you read about Donna Geisler. Use the dictionary to write definitions by the corresponding numbers. Check your definitions by giving this to a friend as a regular puzzle with your definitions (you might use graph paper to make your puzzle).

Across

1.

2.

3.

4.

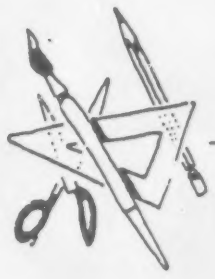
Down

1.

2.

3.

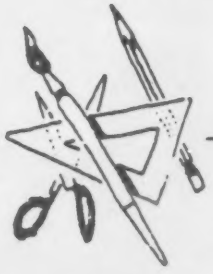
4.



IDEAS FOR PROJECTS

Scrape the insulation from each end of a copper (or other metal) wire and wind the wire around a nail. Attach each end of the wire to a six volt battery. Pass the nail and wire over some paper clips or tacks and count the number that are picked up by the electromagnet. Increase and decrease the number of turns of wire to see what effect this has on the strength of the electromagnet. COMETS Science's Electrically Speaking describes this and other activities that illustrate concepts of electricity. Invite an engineer to class to lead this activity. A speaker from the phone company could show students how an electromagnet is necessary to make the phone work.

Donna Geisler's Profile mentions that she has an advanced degree in applied mathematics. In the section on "Women and Graphs" in COMETS Science's Figures Don't Lie can be found directions for a fascinating series of activities using rotating and revolving coins to make various curves. These curves can be studied for their own sakes or applied to an understanding of the moon's rotation while it revolves around the earth.



COMETS: PROFILE

MARY JO FRAZIER:
Doctor of
Dental Surgery

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Mary Jo Frazier

by Catherine Matthews and Ruth Noyce

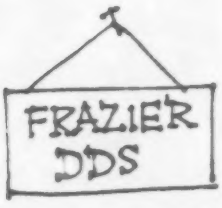
Mary Jo Frazier came from a small farming community to a major state university to continue studying piano, an instrument she had played since she was four years old. When she reported to her college advisor, he suggested that she not confine her studies to music but that she take some other kinds of courses as well. With very high scores on her high school achievement tests, she was able to enroll in honors courses in biology and mathematics.

Just at the time when Jo was questioning her commitment to music, she found encouragement in her biology classes. Her biology professors commented on her excellent performance in that field. One instructor invited her to participate on a research project, and her continuing interest in research dates back to this very exciting introduction to scientific investigation. "I was just eighteen and away from home for the first time. I needed positive strokes," Jo said. "It was important for me to have someone say 'You're good; you're doing well!'"

Because of her collegiate experiences and her emerging desire to "do something practical," Jo struggled with indecision. What would she major in? What would her chosen career be?

Here's the story told by Jo: "One day I was looking through a career listing. I knew by this time that professional piano wasn't for me, but what I didn't know was what was for me. As I went through the alphabetized career listing, I hit the D's and suddenly turned to my roommate, saying, "That's it! I'll be a dentist! Why not? I'm interested in science and I like working with my hands. I like the investigation processes that a diagnostician must go through. I am going to be a dentist!"

After this initial excitement, Jo gave further consideration to her decision. She had worked with her father, a small town dentist, for several years, as an assistant and as a receptionist. She had had many opportunities to watch her father work, and she had seen the admiration and respect in his patients' eyes as they left his office. Moreover, she had observed that her father enjoyed being a dentist, and she considered herself to be quite like him. So that was that! She made up her mind to become Mary Jo Frazier, Doctor of Dental Surgery.

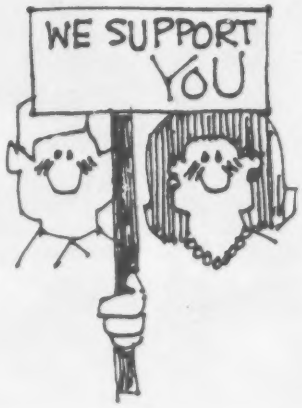


When she informed her college advisor of her decision to pursue a career in dentistry, he remarked that she could just as well go to medical school, on the basis of her undergraduate performance. (Her high school counselor's advice had been quite different. It had been recommended that she go to a nearby small college rather than a major state university, because she was not considered smart enough to succeed at a large university.)

Jo not only "made it" but was accepted for dental studies after her junior year at the university. However, at that time, she thought the life of a physician and the life of a mother-wife were incompatible, and it was the latter that she had been raised to seek. Jo found this especially frustrating and hopes it is something that other women can avoid. "I had no career orientation whatsoever," she explains, "not from my parents and not from my high school."

When Jo told her father that she wanted to become a dentist, he was shocked. "He had never envisioned me in a profession," she said. While her parents were supportive, "they would have supported any decision I made. I could have become a piano player at a bar, a housewife, or whatever, and they would have stood behind me."

After three years of college, Jo started dental school, one of fifteen women in a class of 160. As she looked around at the different women in her class (one woman was 35 years old and married to a rabbi), her attitude about women and careers began to change. "For the first time I realized that there were a number of alternatives in careers and lifestyles. I had thought we'd all be alike, but each of us was unique. We weren't pressed out of the same mold. I also realized that you don't have to have an "A" average to get into dental school. I had come in with one and graduated third in my dental school class, but someone also graduated 160th.



After completing dental school, Jo accepted a general practice residency in San Francisco. She spent one year in a hospital situation working on medically compromised patients (the elderly, the poor, and those suffering from heart attacks, mental retardation, cerebral palsy and multiple sclerosis).

These patients' problems made it difficult for the average dentist to work on their teeth. As a resident, Jo often used nitrous oxide (NO_2) or general anesthesia to work on them. She worked with a number of dental specialists in many different fields and received a salary for the experience.

After her residency, Jo went to Guatemala for five weeks to care for Indian patients in a dental clinic which her father had helped set up in a Catholic mission fifteen years earlier. They hadn't had the services of a dentist for several years, so Jo suggested to her father that he send her there this time. She practiced in the very primitive clinic during a revolution, with the right wing government executing people in the very village where she was working. She became acquainted with third world poverty very quickly. And from the look in Jo's eyes and the sound of her voice when she talks about it, it appears she had mixed feelings about leaving this scene of torture and execution, for five weeks had been quite long enough for her to see that although she was free these people were not.

Jo is now back in the United States, living in Los Angeles, where she is associated with an established general practitioner, now that she has passed the dental boards and become a full-fledged dentist. Each week she spends

four days in general practice and one day as a volunteer at the Florence Crittenden home taking care of the girls' dental needs. And Jo, the dentist, hasn't forgotten how to play the piano, either. She regularly accompanies two young people who dream of becoming opera stars. Music is still a great love, but it is now an avocation for Jo.

Most dental school graduates (80-85%) open a general practice immediately after graduation, but Jo wants to continue in academia, teaching and researching. There is also interesting work available with public health agencies. She wants to maintain mobility in her living situation, life-style, and profession, and has chosen not to make the large financial investment required to open her own practice right now. "Most people assume that a general practice is all you can do, but it's not," stresses Jo. She obviously finds research and teaching just as exciting as general practice.

Dentistry is one of the scientific professions in which women are still very much a minority, according to Jo. While her patients often wonder out loud, "Are you the dentist?" they have not had adverse reactions to her as a professional. In dental school, where patients were assigned to students, not one of her patients requested "that man over there." Some patients have remarked that she, as a woman dentist, has a "gentler touch" or "is better with children," but Jo considers these ideas a stigma. She believes her male colleagues to be just as adept as she is in these areas.

Jo would like to see more women enter the field of dentistry. She thinks that many women who could be very good dentists are wrongly steered toward a job as a dental hygienist instead of a career as a dentist. When she started dental school, there was one woman in the senior class compared to fifteen women in her freshman class. Now there are thirty women in the freshman class. Jo believes that more and better career orientation programs in high school could bolster that number. "When I was little, I pretended not to be bright, because I thought intelligent girls were not regarded positively for their achievements. They certainly weren't encouraged to pursue scientific careers. The hardest thing to do is accept the fact that you are intelligent and can make it on your own."

Jo no longer believes that a career as a dentist is incompatible with the role of wife and mother. She is still torn by family pressures to get married and have children, but, although she still dreams of a white knight, she doesn't really expect to see one. When she does marry, her husband will be someone who realizes that her career is something very important to her, certainly just as important as his career may be to him.

Indeed, Mary Jo Frazier, D.D.S., has carved out her niche, and she will make it on her own for now, but perhaps with a family in the future.

CONTENT QUIZ

1. Why did Mary Jo Frazier believe that dentistry would be a suitable career for her?

2. How did Jo's dentist father react when she told him she wanted to be a dentist?

3. What did Jo find most frustrating in selecting her career?

4. How did Jo's attitudes about women and careers change in dental school?

5. What is a "medically compromised" patient?

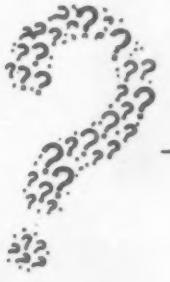
6. Describe Jo's experience in the dental clinic in Guatemala.

7. Now that she is back in this country, what is Jo doing professionally?

8. Why isn't Jo opening her own general practice at this time?

9. Are women dentists more gentle and "better with children," according to Jo?

10. How does Jo believe we can increase the number of women in dentistry?



ANSWERS TO CONTENT QUIZ

1. Her dentist father was happy with his work; she was interested in science; she liked working with her hands; she liked investigating and diagnosing.

2. He was shocked, for he had not envisioned her in a profession.

3. She had no career orientation from her parents or high school.

4. Jo realized that each person is unique and that it doesn't take an "A" average to get into dental school.

5. One who is in any of these categories: elderly, poor, heart attack patients, victims of mental retardation, cerebral palsy, multiple sclerosis.

6. Practicing in a primitive clinic in a small village during a revolution, she observed executions and torture of the people by their government.

7. She is in general practice four days a week and in volunteer service taking care of girls' dental needs one day a week.

8. She wants to be mobile in her lifestyle and profession, and engage in research and teaching.

9. No. She maintains that her male colleagues are just as adept in these areas as women.

10. More and better career orientation programs in high schools are needed.

WORDS TO KNOW

1. Jo Frazier practices general dentistry. If you look in the Yellow Pages under "Dentists", you know that there are other fields of dentistry. What does each kind of dentist listed below specialize in?

Dentist:	Specializes in:
orthodontist	----------
prosthodonist	----------
periodontist	----------
pedodontist	----------
endodontist	----------

2. Using a dictionary, find as many words as you can which begin with the prefixes listed below combined with different suffixes. Try to guess the meaning of each word by thinking about the meaning of each prefix before looking at the dictionary definition.

Prefix:	Word:	Meaning:
ortho-	orthography	----------
	----------	----------
	----------	----------
	----------	----------
peri-	periphery	----------
	----------	----------
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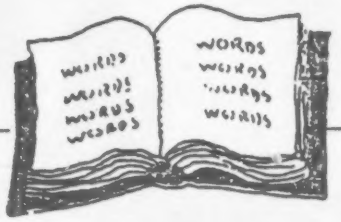

WORDS TO KNOW

ped-	pedology	----------
	----------	----------
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endo-	endomorphic	----------
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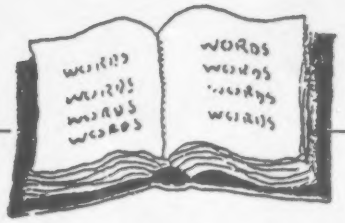


IDEAS FOR WRITING

1. Write a paragraph explaining the term "third world poverty," which appears in the description of Jo's experiences in Guatemala.

2. What does "oral pathology" mean? Find out what you can about it, and define it in a written paragraph.

3. Imagine that you were in Guatemala for five weeks while Jo was there, and that you kept a weekly diary. Write a brief journal based on your experiences.

4. Did Jo's father participate (directly or indirectly) in the decision-making process, as she considered becoming a dentist? Describe his role in a written paragraph.

5. Imagine that Jo chose a career in music performance rather than dentistry. Write a description of her personal and professional life as a musician.

IDEAS FOR PROJECTS

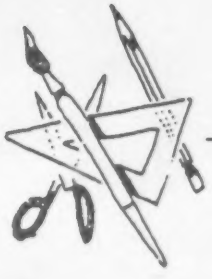
1. Investigate the political situation in Guatemala at the present time and compare it with the description in Jo's profile. Design a poster to show the difference.

2. If you could leave next week for a short stay in any country of your choice, where would you choose to go? Locate a few sources of information on that country and prepare your own travel brochure, listing and describing places you will plan to visit.

3. Find out all you can about the anesthetics used by dentists on their patients. Make a chart listing the various kinds, their uses, and their effects.

4. What does a public health dentist do? Research that career and present the information in an oral report. Try to interview a dentist working in that career.

Students can make a mold of their teeth by pressing clay against their top teeth and pouring plaster of Paris into the impressions made by their teeth. The process can be repeated for the bottom teeth. COMETS Science's Pearly Gates elaborates on the directions for this activity. Invite a dentist, dental hygienist, or dental technician to class to lead students in this activity and then relate it to their career work.



COMETS: PROFILE

CYNTHIA DUSEL-BACON

Geologist

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS

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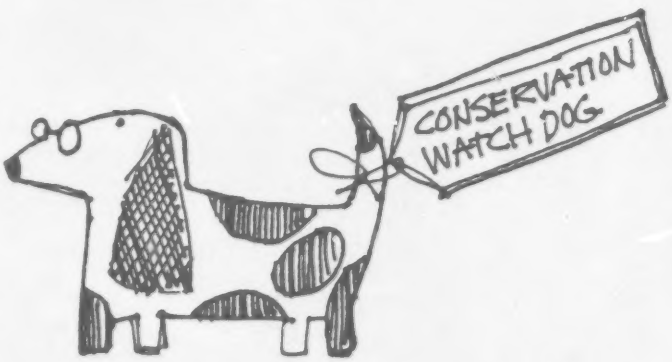
Cynthia Dusel-Bacon

by Ruth Noyce

Dear Friends,

I have been told that you are curious to know what makes a geologist tick. Since geology is my career, I've been asked to tell you a little about myself and my profession. I work for the U. S. Geological Survey, an organization under the Department of the Interior, in Menlo Park, California, the location of one of the Survey's three large centers. I am a member of the Branch of Alaskan Geology, which is within one of the four Geological Survey divisions.



I'll explain more about the Survey here at the start of my letter in order to help you understand my job activities and responsibilities. There are four very different USGS divisions. Most people think of the National Mapping division when they think of the Geological Survey, because it produces the popularly-used topographic maps, showing the contours that describe the configuration of the earth's surface. This is only one kind of information that comes out of the Survey, however. The Conservation division is a watchdog on industry, overseeing leases for oil and gas drilling and geothermal exploration. Then, there are the Water Resources and Geologic divisions. My husband and I are both in the latter, which does most of the geologic research and geologic mapping.

My specialty is studying metamorphic rocks. These are rocks that have been affected by heat and pressure and recrystallized under these two conditions. Quartzite is an example of a metamorphosed sandstone. Instead of having individual rounded grains, the quartz in the sandstone and some other minor minerals have recrystallized to form a very hard fabric. You're probably familiar with metamorphic rocks - slate and marble are other examples. I've been studying these sorts of rocks in east central Alaska, in an area known as the Yukon-Tanana Upland.

I started out assisting on a mapping team to map rock units, faults and mineralization in a large quadrangle, about 6,000 square miles, in Alaska. There's a lot of country, even working on the map for three summers. The area has few roads, so we commuted to work by helicopter, usually being dropped off on the top of a ridge, where exposure of rock is best and landing places are most available. I worked by myself, plotting my route on a topographic map. That map and my rock hammer were the most important tools I had. I walked along (we call this walk of up to about 10 miles a "traverse") breaking off

pieces of rock with my hammer, observing the fresh surface of the rock, taking notes and measurements, collecting samples, which I put in a large pack I wore on my back. Each of us worked on a different ridge, usually many miles apart. Several times a day we communicated with walkie-talkie radios, telling each other how we were doing and discussing pick-up times with the helicopter pilot. Staying in radio communication with the pilot was also a safety precaution in case anyone was hurt. After we were all picked up we would fly back to a motel where we stayed.

The third summer of mapping was an unlucky one for me, because I apparently didn't give enough warning to a bear I encountered on a traverse. I should explain this. Our attitude about working in country where bears were was to be careful about food smells, never carry open food that might attract a bear. Before we would land on a ridge, we would usually fly the ridge that we intended to walk, looking for bears. We'd try to make enough noise to alert any bears in the area to our presence. Since they prefer not to encounter humans, we could count on them leaving the area. This usually worked, but I had seen about a half dozen bears during the summers, although not at close range. We generally did not carry guns, and usually worked alone in order to cover the maximum amount of terrain.

On this particular occasion, I was hiking alone on an old trail, stopping at an outcrop and banging on a rock. All of a sudden, a small black bear popped out of the brush about ten feet in front of me, and I knew at that moment that what I did was going to determine what would happen to me. I had to think quickly about what I should do, and having scared off a bear during a previous encounter, I spoke to the bear in a low voice, in kind of a menacing fashion, saying, "You better get out of here bear." Then I clapped my hands and waved my arms. The bear just looked at me.

It probably had been asleep in the brush when I startled it, and was below me on the slope, making me more of a threat. The bear started walking up the slope, keeping its same distance from me, making a half circle coming up to the path I was on. At this point, it was a little above me up the path and about ten feet away. Basically, my situation was like being in a zoo cage with no weapon whatsoever, so I continued trying to scare the bear away. It looked up the trail and then looked at me, and I could sense it was trying to decide what to do.

The bear finally decided to attack me. It ran around behind me and knocked me down on my face so quickly that I couldn't even turn my head to watch it. The bear bit into my right shoulder. I decided to play dead, having heard that bears have been known to leave people along if they think they are dead. I froze, but the bear didn't stop biting into my shoulder.

At this point, I realized I was going to have to try and call for help, so I reached with my left arm to get my radio from the pack on my back. To my horror, I discovered that the pack pocket was buckled shut and that it was impossible for me to unbuckle it from this awkward position. I told myself then that, if the bear didn't decide to leave me alone, it was the end. Over the course of the next hour, the bear proceeded to have me for lunch.

It ripped into my right shoulder and side, sinking its teeth into the upper part of my right arm and dragging me down the hill every once in awhile. It seemed to be dragging me someplace where it was going to keep me and actually did begin to dig a hole, as bears often do to bury their prey. It really thought of me as its prey. The act of dragging me around and consuming my flesh was quite exhausting for the bear, and so it would stop every 25 feet, pant in my ear, and show obvious signs of being tired. I soon learned that it doesn't take a big towering grizzly to do great damage - people are no match for teeth and claws.

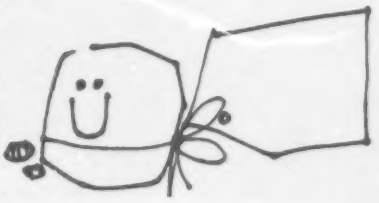
Anyway, the bear decided to move about five feet away from me, sit down, pant, and rest. At this point, I was just three days from my thirty-first birthday, had been married to Mr. Perfect for only five months, and could not tolerate the idea that all of a sudden it was going to end so quickly and unfairly. All through the attack I had been plotting how I could possibly get out of this situation, which was the worst way to die a slow death. So, taking advantage of the bear being a little away from me, I reached again with my left arm and discovered that the buckle had been ripped open. I was able to get my radio out and call for help. In a calm voice, I said, "Ed, this is Cynthia. Come quick. I'm being eaten by a bear."

Then the bear got up, knocked the radio from my hand, and proceeded to do in my left arm. I had no idea whether or not the message had been heard, but I heard a helicopter flying over the next ridge about ten minutes later. It left again, though, so I figured it was just going to get fuel or something. It came back in about ten minutes and flew over me low enough to scare the bear away. Finally the helicopter returned with two geologists who helped the pilot carry me up the hill. Several hours later I was taken to an army hospital where my left arm was amputated halfway between the elbow and shoulder. The next day I was flown to Stanford University Hospital where an effort was made to save my right arm by taking a vein out of my leg and grafting it on the arm. Because of infection, this failed and eventually my right arm had to be amputated at the shoulder.

About five months later, I was fitted with artificial arms with hooks on the ends, which is the most functional thing to do. But, many of the things I need to do cannot be done by artificial arms, no matter how well they are made. So I also have to use my legs and feet as a major resource now. I've learned how to use my feet in the kitchen for cooking and doing dishes while sitting on a bar stool with casters. I can be completely independent except for a few things, like buttoning my shirt. I am able to stay by myself for months at a time while my geologist husband is off working in the field.

I am still working in the same area of Alaska, and although I can no longer do regional mapping I have been back to Alaska twice for short term field work. I do more microscope work now, using a petrographic microscope which lets me look at the minerals in a rock. Besides identifying minerals, I can see the relationship between the various minerals (the order in which they grew), the texture of the rock, and the amount of recrystallization or deformation that has taken place. I can answer some very important questions about rocks using a microscope that has been modifyied for me. An engineer and machinist at the Geological Survey have made foot pedals for it which change the focus and move about the slides for me.

Some of the rocks I examine are about two billion years old. I have been writing papers summarizing the data and conclusions we've reached in east central Alaska and I am finding it a very exciting project. Another project I work on is part of a world-wide effort to compile maps giving information about the metamorphic rocks in all countries, and I am doing this for all of Alaska. The most fascinating aspect of geology to me is the concept that we can go back hundreds of millions, even billions, of years and know what was happening on this earth. Human beings are a very minor part of the earth's history. It's humbling to study geology and to realize that our greatest strength is our being able to understand things that came way before us and will last long after we, as a species, are gone.



As a geologist, I enjoy having the opportunity to be out-of-doors in interesting places learning more about the earth. I also like the idea of not having the same work routine every day. Our activities are so varied - we gather and compile information, write papers, publish maps, present talks at scientific meetings, etc.

This is a dangerous profession, though. There are many hazards in dealing with nature, such as rock falls, volcanic eruptions, landslides and wild animal attacks. People in the outdoors are very susceptible to drowning accidents, too. The biggest cause of death in Alaska in our branch has been drowning in rivers, because people can't survive long in the cold water. Flying a helicopter is also very dangerous.

It's quite typical of geologists to be interested in many aspects of the outdoors. My husband and I are bird watchers and we go birding on weekends together. I have special binoculars that are mounted on a post which fits on my belt that can be raised, lowered, and tilted. We enjoy cycling with our tandem bicycle, too - all I have to do is pedal. It's quite typical of geologists to be interested in many aspects of the outdoors. If you're someone who really enjoys nature, you might start thinking about rocks, because they are the oldest part of the earth and tie everything together. I see them as intriguing mysteries. Trying to unravel the history of the earth is really a challenge!

Good luck in your future career decisions,

Cynthia

CONTENT QUIZ

Test your recall of the information in Cynthia Dusel-Bacon's Profile by completing each FACTS IN THREES square below:

1. The three other divisions of the U.S. Geological Survey besides Cynthia's

   1.
   2.
   3.

2. Three examples of metamorphic rocks

   1.
   2.
   3.

3. Three kinds of information Cynthia's team mapped in their Alaska quadrangle

   1.
   2.
   3.

4. Three activities Cynthia carried out on an Alaskan traverse

   1.
   2.
   3.

5. Three precautions the Alaskan mapping team Cynthia was on regularly took against bears

   1.
   2.
   3.

6. Three things Cynthia can determine about rocks with her petrographic microscope

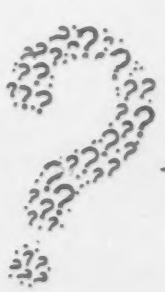
   1.
   2.
   3.

7. Three of the varied activities geologists are engaged in

   1.
   2.
   3.

8. Three of the natural hazards threatening geologists in dealing with nature

   1.
   2.
   3.



ANSWERS TO CONTENT QUIZ

1. National Mapping, Conservation, Water Resources

2. quartzite, slate, marble

3. rock units, faults, mineralization

4. collecting samples, measuring the orientation of surfaces, taking notes

5. fly the ridge first to look for bears, carry no open food, make noise in the area to alert them

6. identify minerals, discover the order in which minerals grew, examine the texture and see how much recrystallization or deformation has taken place

7. gather data, compile information, write papers, publish maps, talk at scientific meetings

8. rock falls, volcanic eruptions, landslides, drowning, wild animal attacks

WORDS TO KNOW

1. Cynthia Dusel-Bacon uses words in her letter that are unique to the vocabulary of a geologist. By discovering the meaning of each of these words, you will broaden your understanding of the field of geology!

topographic _____

contour _____

geothermal _____

geologic _____

metamorphic _____

recrystallized _____

quartzite _____

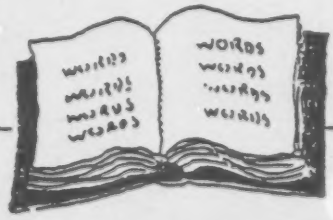
mineral _____

outcrop _____

petrographic _____

2. Geologists give special meanings to some words you already know. Try to find the geologist's meaning for the words below:

	Popular Meaning	Geologist's Meaning
exposure	_____	_____
fault	_____	_____
traverse	_____	_____
fabric	_____	_____
quadrangle	_____	_____
fold	_____	_____
relief	_____	_____
stress	_____	_____



IDEAS FOR WRITING

1. Prepare a newspaper release about Cynthia Dusel-Bacon's accident in Alaska, writing the account from a news reporter's third person point of view.

2. Write to the Public Inquiries Officer, U.S. Geological Survey, Department of the Interior, Menlo Park, California 94025 requesting information about the work of its four divisions. Develop a learning center on Geological Survey careers for your classroom with these materials.

3. Contrast the type of rocks found on the moon with those earth rocks described by Cynthia Dusel-Bacon (quartzite, sandstone, metamorphic). A useful book for this purpose is CITY ROCKS, CITY BLOCKS AND THE MOON by Edward Gallob (Scribner, 1973).

4. Select one of these geology terms, research it, and with others, prepare a page for a class-produced book for a geology learning center. Include an explanation and a colorful illustration of the word on your page:

fossil	caldera
sedimentary	strata
igneous	Precambrian Age
stalagmite	crystal
Paleozoic Age	shale
Mesozoic Age	glacier
Cenozoic Age	gneiss
schist	

5. Cynthia Dusel-Bacon and Jan Armstrong (Zoo Administrator) have both been involved with wild animals in their careers. After reading both profiles, write a human interest story comparing the experiences of the two women.

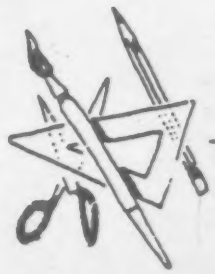
IDEAS FOR PROJECTS

1. Research the work of the Geothermal Research Program of the Geological Survey, Menlo Park, California 94025 and prepare an informational poster for your class. An excellent book to use is UNDERGROUND FURNACES: THE STORY OF GEOTHERMAL ENERGY by Irene Kiefer (William Morrow, 1976).

2. Investigate the phenomenon at Stonehenge in England. Give an explanatory talk to your class, expressing your own opinion of the origin of this rock formation. Franklyn Branley discusses the theories of scientists from various fields in THE MYSTERY OF STONEHENGE (Crowell, 1969). His book SHAKES, QUAKES, AND SHIFTS (Crowell, 1974) also presents interesting information on rock formations.

3. Compare the geology career description found in WHAT CAN SHE BE? A GEOLOGIST by Esther and Gloria Goldreich (Lothrop, 1976) with the one in Cynthia Dusel-Bacon's letter. Prepare a list of career options open to anyone who majors in geology in college.

4. Explore some of the other careers which might be attractive to natur lovers by browsing in the biography section and card catalog of your school library. On index cards, list each biography you find that you would recommend to the nature lovers in your class and prepare a "Nature Careers" file for them to use in book selection. Categorize your card file according to various aspects of nature, i.e., birds, trees, water, mammals, etc.



IDEAS FOR PROJECTS

5. Increase your understanding of a favorite aspect of geology by reading one or more of these books:

   DIG! A JOURNEY UNDER THE EARTH'S CRUST by John and Faith Hubley (Harcourt, 1973)

   UPDATE REPORT ON THE PLANET EARTH by J. Shurkin (Westminister, 1976)

   THE STORY OF GEOLOGY by J. Wyckoff (Golden Press, 1976)

   DRIFTING CONTINENTS, SHIFTING SEAS by P. Young (Watts, 1976)

   INSIDE THE EARTH by A. Davis (Grosset, 1973)

   WONDERS OF THE EARTH by E. Bauer (Watts, 1973)

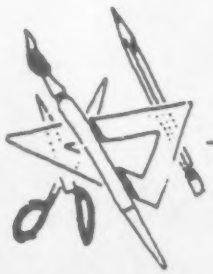
   A STUDENT EARTH SCIENTIST EXPLORES THE GEOLOGIC PAST by L. Blackbeer (Rosen, 1976)

   HOW THE EARTH BEGAN by M. Hunter (World, 1972)

6. Study about the various kinds of rocks which can be found on the earth and display what you learn in a picture chart.

Make a long shallow box (about 18" x 48" x 3"), line it with heavy plastic (such as a trash bag), and fill it with sand. Prop up one end of the box, gently pour water into the top end, and catch the water at the bottom. Make "stream beds" in the sand and study the history of the stream under various conditions (e.g., fast or slow water, steep or gradual incline, few or many obstacles in the stream). Invite a geologist to class to relate the study of this "stream table" box to concepts used by geologists in their work. COMETS Science's Fluid Follies describes this and related activities.

Have students make two identical triangles and challenge them to use these two triangles to make a square, a parallelogram, and another triangle. COMETS Science's Third Dimension describes other activities involving two and three dimensional structures and relates these activities to the work of geologists.



COMETS: PROFILE

JOAN DUEA:
Science Teacher,
Writer, and Consultant

COMETS

189

Career Oriented Modules
to Explore Topics in Science

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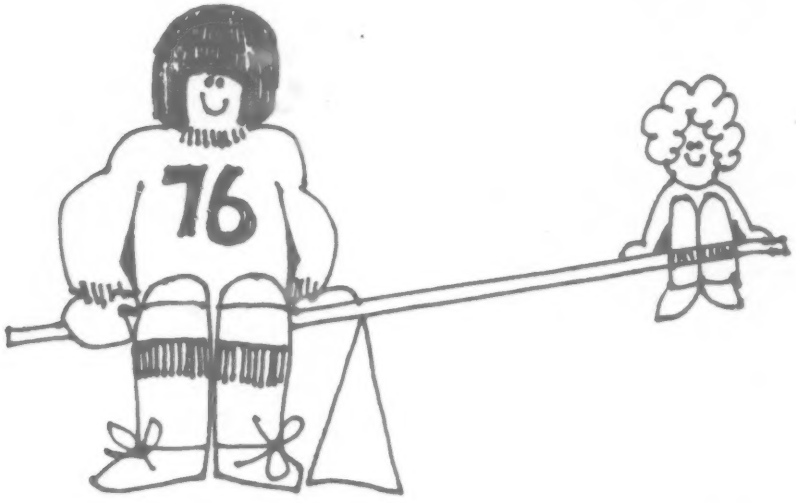
Joan Duea

by Ruth Noyce

A famous football star sits on a see-saw to demonstrate the idea of leverage. A huge supertanker spills great quantities of oil, destroying the environment around it. "The Bloodhound Gang" embarks on a mysterious adventure. These are typical scenes from an action-packed science series on public television: "3-2-1 Contact."



For those who view the show, "3-2-1 Contact" means fun with science. The Children's Television Workshop series, which helps eight to twelve-year-olds understand scientific concepts by relating them to their daily lives, is entertaining because people like Joan Duea (pronounced "Dewey") have helped to make it that way.

During the two years Joan worked with specialists from CTW, IBM, Xerox, Harvard, MIT, and Yale to help create "3-2-1 Contact," she was the only elementary classroom teacher on the sixteen-member panel of advisors for the program. Here's how it happened:

This energetic and resourceful teacher of second and third graders believes she was in the right place at the right time when, as president of the Council for Elementary Science International (a division of the National Science Teachers Association), she was invited to take part in a planning seminar for the series. When she was asked later by the Children's Television Workshop, producers of "Sesame Street" and "The Electric Company," to actually participate in making the series, Joan eagerly accepted the honor, considering it a once-in-a-lifetime opportunity.

As she worked on the permanent panel of advisors for the series, Joan found the producers and specialists in that group ready and willing to listen to a teacher's point of view. Believing that her selection as an advisor speaks highly of the profession of classroom teaching, she feels good about her contributions to each phase of the program - even the choice of a title for the show. (She explains that, after many hours of discussion, they decided the noun "contact" best described the show's purpose, which is to put children in touch with new ideas.)

In an entertaining way, "3-2-1 Contact" tries to demystify science, explaining misconceptions and satisfying curiosity with answers based on our technology. The choice of two young women and a black male (all about twenty years old) to host the show reflects the desire of the producers to reach girls and minority children.

Research quoted by the Children's Television Workshop has shown that science is often a turnoff to girls and minorities. One study reported twenty-five percent of sixth-grade boys said they were interested in science and engineering, while only three percent of the girls indicated interest in these areas. Another National Science Foundation study revealed that women hold only eleven percent of the jobs in science and engineering, even though they make up more than forty percent of the total work force. Minorities occupy only three percent of the science and engineering positions.

Joan is proud to say that the series pictures women and minorities in a variety of science careers and provides role models in scientific fields for females and minorities. Reflecting on her own experience as a woman in a non-traditional role, Joan says, "One might wonder if I have had difficulty working in professional organizations where men usually had the leadership roles. I have found that it doesn't make any difference whether you are male or female, as long as you demonstrate the characteristics of a good leader. If you can listen to what people have to say, respond to their ideas, and function according to a well-organized structure, you will be a successful leader. The person in charge of Children's Television Workshop is a woman, and I consider myself fortunate to have had the opportunity to observe her fine example of effective leadership."

Since Joan considers herself the product of a number of excellent science teachers, who encouraged her involvement in science from the time she was a junior high school student, she is sold on the importance of good role models in the

process of career selection. While she remembers well the positive influences some of her former science teachers had upon her interest in the field, she is also very much aware that her own teaching style is quite different from theirs.

"I had a general science teacher in junior high school whose class I really enjoyed. He did very little hands-on work with us," Joan reflects. "That's something most of today's good science programs include. But he was so committed to his teaching and so well organized in his lecturing that he was a good motivator for me."

"I don't recall too much of what I did in the early years," continues Joan, "although I remember every teacher I had. There were some fine teachers who kept me involved and interested in science. The most outstanding one of all was my high school biology and chemistry teacher, a true lover of nature. He was warm and genuine with his students; it pleased him to have us around. I think the attention he gave me in his classes kindled much of my desire to work in the area of science."

Besides being a teacher of children, Joan is a supervisor of student teachers and a demonstration teacher in the laboratory school of a midwestern university. Students in methods courses at the university come to her classroom frequently to watch her teaching and to participate in their first field experiences. The students who come to Joan's classroom have the rather unusual opportunity to observe a team of four teachers doing most of their planning and much of their teaching together. Joan and one of these teachers have adjoining classrooms, sharing children in a kind of open environment.

"You have to enjoy people and be willing to work very close to them in the occupation of teaching," she comments. "You need to communicate well and capitalize on the ideas of others. It's difficult to have enough time for everything you would like to do, too. I usually leave my school about five or five-thirty every night and still carry home a little bag of things to continue doing."

During her sixteen years of teaching, Joan has observed that the people best suited to be teachers are those who can model other people's feelings, because they can understand and empathize with their students. They are able to help children handle some of the emotions they must learn to control as they grow older. "Probably patience is that quality I draw on most heavily as a teacher," Joan adds. "You need patience and patience and then more patience. Whenever you work with other people this becomes a critical part of your relationship."

Although science is one of Joan's favorite subjects, she admits that it is not easy to teach. "I try to stress science processes with my students, to help them become careful observers who are able to collect data, analyze it, and communicate their thoughts," she explains. Joan is constantly curious about interesting facts and enjoys drawing the attention of children to them. She believes that learning should involve children's hands as well as their minds. Science, in Joan Duea's classroom, means doing, building, and making.

"I guess I've always been very curious about the things around me" she recalls. "As a little girl, I'd turn on the faucet and ask, 'Where did that water come from?' or I'd turn it off, watch the water go down, and ask where it went. At a fairly young age I could squat down and remain motionless observing an ant for quite a long time. Because those kinds of first-hand experiences furthered my interest in science, I believe young children should have opportunities for observation and experimentation."

Joan's chief professional goal is to contribute to the education of as many children as she can. She accomplishes this by writing textbooks and materials in math, science, and social studies. Each year she is reaching more and more children and their teachers in this way. Her most recent major project has been the directing and writing of parts of a newly published science program for children in the elementary grades.

"My husband wrote all the tests for that program," Joan enthusiastically explains. "He is involved in education, too, as an administrative assistant in a university, and we enjoy writing together. He makes my professional life possible by taking an active role in our home and in the raising of our two daughters, Jill, 15, and Joy, 11. We are also fortunate to have two sets of grandmas and grandpas nearby, who are always delighted to come over and be part of our family when we have speaking or writing engagements that take us away from the girls for long periods of time."

Joan and her husband don't usually get to their writing until nine o'clock or later, after they have spent the evening with Jill and Joy. But, since they are both researchers and writers, often writing on the same projects, they will frequently write together until between twelve and two in the morning.

One of the most exciting of Joan's current projects is serving as an advisor for the "3-2-1 Contact" magazine, published by Children's Television Workshop as a supplement to the televised series. The idea behind the colorful new magazine, according to Joan, is to "whet kids' appetites" for science.

This dynamic science teacher is just the right person to do that!

CONTENT QUIZ

1. How did Joan Duea happen to become involved in the production of "3-2-1 Contact"?
2. Why did the panel name the science series "3-2-1 Contact"?
3. Why were two young women and a black male chosen to host "3-2-1 Contact"?
4. What percentage of the jobs in science and engineering fields do women hold?
5. What factors have influenced Joan to pursue a science career?
6. What kinds of teaching does Joan do besides the teaching of children?
7. List three qualities one needs in order to be a good teacher, according to Joan.
8. How many years has Joan been teaching?
9. Describe Joan's approach to science teaching in her classroom.
10. What kinds of materials does Joan write?

ANSWERS TO CONTENT QUIZ

1. Joan was asked to participate as president of the Council for Elementary Science International.

2. The purpose of the series is to put children in touch with new ideas.

3. The producers wished to reach girls and minority children.

4. Eleven percent of the jobs

5. Excellent science teachers; her own curiosity

6. She supervises student teachers and demonstrates in the laboratory school of a university.

7. Enjoy people, communicate well; capitalize on the ideas of others; model other people's feelings; patience (3)

8. Sixteen years

9. Science processes are stressed through hands-on activities; children are involved in doing, building and making; they learn to observe, collect data, analyze it, and communicate their thoughts.

10. Textbooks and materials in math, science, and social studies

WORDS TO KNOW

Space exploration has stimulated the creation of some new compound words, i.e., two commonly used words are combined, forming a new word to name a process or discovery related to space technology. On the lines below, write as many of these new compound space words as you can discover:

---------- ---------- ----------

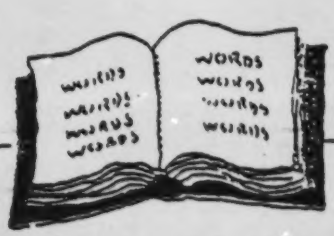
---------- ---------- ----------

---------- ---------- ----------

---------- ---------- ----------

Another word-making process often used in space science is the building of an acronym, by combining the first letters of the words involved, as in NASA (National Aeronautic and Space Administration) and RADAR (Radio Detecting And Ranging). In the spaces below, write as many acronyms and their meanings as you can find (not necessarily related to space technology):

	Word	Meaning		Word	Meaning
1.	----------	----------	7.	----------	----------
2.	----------	----------	8.	----------	----------
3.	----------	----------	9.	----------	----------
4.	----------	----------	10.	----------	----------
5.	----------	----------	11.	----------	----------
6.	----------	----------	12.	----------	----------



IDEAS FOR WRITING

Paragraphs:

1. Summarize, in a paragraph, the qualities that make a good teacher, according to Joan Duea.

2. What reasons can you think of to explain the lack of interest in science careers demonstrated by women and minorities in our society? Write an explanatory paragraph expressing your opinion about the factors influencing their career choices.

3. Define a 'good teacher" in your own words.

4. After reading the description of the television series "3-2-1 Contact" in Joan Duea's profile, think up another name for the series and write an explanation of your reasons for selecting the name.

Themes:

1. Write an original adventure for "The Bloodhound Gang," creating a new gang of your own, if you wish. Be sure to include a scientific or technological concept of some kind.

2. Think about a favorite teacher you have had, and try to recall the personality traits of that person. Develop a character sketch to describe that special teacher.

3. Read one issue of the magazine "3-2-1 Contact" and write a commentary, expressing your opinions about the regularly featured sections (Factoids, Any Questions, Reviews and Previews, List of the Month, etc.).

4. Choose an organ of the body to research and find out all you can about how it works. Using this information, write and illustrate a lively article about this part of the body for the "3-2-1 Contact" feature, "Busy Bodies."

IDEAS FOR PROJECTS

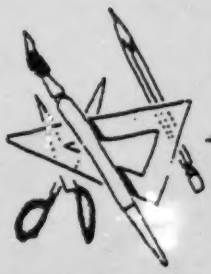
1. Design a colorful magazine ad to publicize the television series "3-2-1 Contact." Base your ad on the information about the series given in Joan Duea's profile.

2. Place yourself in the role of a reporter for "3-2-1 Contact" magazine. Write six questions you might use to interview a famous scientist for a news story to be included in a future issue. (Remember to use these key words: who, what, where, when, why, how).

3. In your school library, find a biography about one of these famous women in science: Rachel Carson, Maria Mitchell, Lise Meitner, Marie Curie, Emily Dunning, Mary Anning. After reading the book, write a short article about this woman suitable for publication in "3-2-1 Contact" magazine.

4. Start your own collection of "Factoids" on a favorite topic (science, sports, weather, etc.) by searching through THE GUINNESS BOOK OF WORLD RECORDS and current trivia books for interesting facts to list.

Hold two rectangular mirrors against each other at arm's length with your nose reflected on the juncture between the mirrors. Wink your right eye and note that the usual eye winks back. While holding the mirrors against each other at arm's length, rotate the outer edge of each mirror toward you until your face reappears in the mirrors. Again wink your right eye and see that the "wrong" eye winks back! See COMETS Science's Light and Sight for an illustration to supplement these directions and for additional activities. This kind of activity can be captivating, just as "3-2-1 Contact" fascinates TV audiences.



COMETS: PROFILE

GISELA DRESCHHOFF:
Physicist

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Gisela Dreschhoff

by JoBeth Allen

Interviewer: Congratulations on another successful expedition to Antarctica, Dr. Dreschhoff. Could you tell our readers about your research at the South Pole?

Dreschhoff: Our main interest is in measuring the gamma radiation in the rocks.

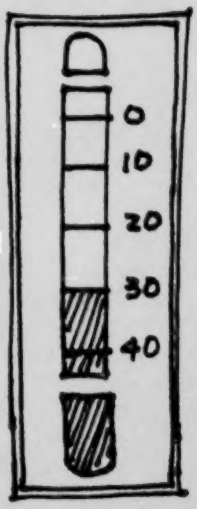
Interviewer: I thought everything in Antarctica was covered with ice.

Dreschhoff: Most people think that. However, 3% of the continent is free of ice and it is mostly high mountainous terrain. Those are the areas that we chose for our survey. Helicopters take us from the main base to remote mountainous regions where we measure gamma radiation from radioactive elements in the rocks. This is a way of detecting concentrations of uranium, thorium, and potassium.

Interviewer: That sounds dangerous. Do you wear special equipment?

Dreschhoff: No, because the level of radioactivity is very low. Actually, all rocks are radioactive to some degree. We do look for areas of high concentrations of uranium or thorium, but there is no danger due to radiation.

Interviewer: What about dangerous situations created by the elements?



Dreschhoff: Our training and equipment have prevented any problems. After four years of research there, I am very conditioned to the cold. Those who are not can have a rough time! I remember one incident three years ago that made all of us on the research team aware of how well we have adapted to conditions down there. We were at the South Pole measuring fallout in the ice. It was a warm day at the South Pole, about -30° Fahrenheit with high winds. The ice sheet is about 8000 feet thick at the South Pole and the station has an elevation of over 9000 feet above sea level. This makes it difficult to work because of the high altitude. We had worked hard for two days, and were sitting around the mess hall waiting for dinner. Just then two huge, muscular construction guys blustered in. "I can't stand it out there - it's so cold!" complained one. "How long did you stay out?" queried his partner. "Twenty minutes," he moaned, "and I couldn't stand another minute."

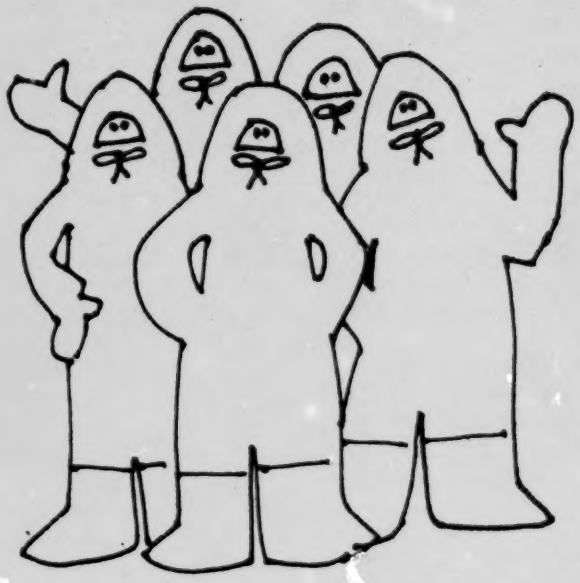
Interviewer: How do you get in such excellent condition?

Dreschhoff: It's mostly a matter of desire and commitment, I feel. People can do almost anything they really want to. Antarctica is one of the most demanding spots on the globe, but even there desire is more important than big muscles. We are well prepared, also. They issue heavy clothing and provide a survival course, taught by the mountaineers in New Zealand. In that training we learn things like what to do if we fall in a crevice, and how to lessen danger from extreme cold.

Interviewer: You mentioned New Zealand. Is that on your route from the United States to Antarctica?

Dreschhoff: Right. The National Science Foundation, which supports all US research in Antarctica, contracts with the Air Force and the Navy for logistics support. An Air Force C-141 jet takes us from the west coast to New Zealand, where we receive all our survival clothing. If it is early in the season, say from the middle of October to mid-December, the Air Force Starlifter will transport us the rest of the way to Antarctica. After December 16, and it is almost exactly that day every year, the sea ice starts to get thin and break up. At that point only the Navy's C-130 airplanes can be used because they are equipped with skis to land and take off from the much rougher but permanent ice shelf.

Interviewer: You land on different kinds of ice with the two planes?



Dreschhoff: The Starlifter uses the sea ice as a runway. It is relatively smooth for a wheeled aircraft. But as it thins and breaks, we switch to the permanent ice, which is about 400 feet thick.

Interviewer: Once you have landed, do you all go to a central location?

Dreschhoff: At first everybody stays at the main base, McMurdo Station. From there scientists are flown to inland stations, including South Pole Station, or one of the remote camps. The four permanent U.S. stations are occupied during the whole year, even during the winter with total darkness for at least three months. During the summer, there are almost a thousand people down there, more and more of them women. However, in the remote camps, I am the only woman.

Interviewer: Were there any problems with that?

Dreschhoff: Not at all. Everyone is very professional. This year, a journalist was sent out with me. When she got back to New York, she told everyone she had had the greatest time of her life out there!

Interviewer: Aren't you terribly isolated?

Dreschhoff: We are totally dependent on support from the airplanes. If they can't get in, we don't have food or anything else.

Interviewer: What about running water?

Dreschhoff: The main station, McMurdo, has hot and cold running water. At the remote stations, we must melt snow for water, and often go two weeks without a shower.

Interviewer: How did you get involved with the Antarctica project?

Dreschhoff: That is a very long story. My training was in physics and geology. In my first job in Germany I was responsible for detecting radiation from the reactors. I measured radiation from soil, water, and air. During that time, I went to a meeting of the International Atomic Energy Agency in Vienna. There I met a professor from the United States who needed a physicist. He invited me to come to the U.S. for a year and work with him; I've been here ever since.

Interviewer: Do you do the same kind of radiation work you had been doing in Germany?

Dreschhoff: Actually, our Antarctic research is very similar to what I did previously in Germany. However, during my first years here in the United States the projects I worked on made use of a particular accelerator. We studied the effects that this radiation has on different materials. This led to space research and eventually to Antarctica.

Interviewer: How in the world did you go from accelerated particles to space research?

Dreschhoff: In space you have both a great deal of interplanetary dust and fast particles emitted by the sun and other stars. We could simulate the steady streams of energetic protons from the sun with our accelerator. From this we could determine the possible effect of the particles on the interplanetary dust.

Interviewer: With which phase of the space program did you work?

Dreschhoff: We were connected with the Apollo program to some extent. The dust on the lunar surface has been exposed to this kind of radiation for millions of years. Because of our experience with these effects, NASA asked us if the irradiated dust might pose a hazard to the astronauts. We thought that it was possible that it might because the irradiated dust could be chemically reactive with oxygen or water in the lunar lander. Dust would accumulate on the space suits and might cause a small explosive reaction burning tiny holes in the astronauts' suits. That would of course stop further exploration on the mission. It turned out that this problem never developed.

Interviewer: Why was that?

Dreschhoff: During the descent to the lunar surface, the retrorockets blasted away the top surface of the lunar dust and the gases reacted with what remained. The astronauts on Apollo 11 never walked outside the radius of the retrorocket effects. Later, on Apollo 12, they did explore at a greater distance, but by then NASA had changed the procedure. Before the astronauts reentered the lander they were cleaned of most of the moon dust with a vacuum system.

Interviewer: You mentioned earlier your first job was in Germany, Dr. Dreschhoff. Were you born there?

Dreschhoff: I was born in a small city in West Germany - my family is still there. I manage to see them about twice a year.

Interviewer: What were the schools like in Germany when you were there?

Dreschhoff: They were quite different from the American system. I didn't attend too much grade school because of the war, but I went to high school for nine years. In the German school system, children who plan to attend high school go to grade school for only four years, then to high school for nine. Those who do not plan to attend high school stay in grade school for nine years.

Interviewer: How can children at age ten make such an important decision?

Dreschhoff: There was really no question for me; it simply was expected by my parents so all their children did it. It was a fairly traumatic time, though. There was an all-day exam that determined whether or not one could get into high school; if I had failed that, I certainly would not be Dr. Dreschhoff today!

Interviewer: What kinds of courses did you choose in high school?

Dreschhoff: There was no choice - that's another big difference in the German and American educational systems. Many courses in science and math were required, so I took them. I basically agree with that system. Most young people really don't know what they may need later in life. It seems logical to have exposure to as many areas as possible during the early years of school, so that when a person is ready to make a career choice, he or she will have some background. It might have been easier for me to say, "That's hard," or "I don't like math so I won't take any." But that kind of decision at twelve or fifteen certainly would have limited eventual choices.

Interviewer: Did you like your high school science courses?

Dreschhoff: To be honest, I had some real difficulties with science. At the end of the war many German schools were completely disorganized and I was caught in one of these. It was not until my final year of high school that I decided to go into physics. Even though I had hated physics, I realized that I had learned that it was a tool in discovering things that really did interest me. I was fascinated with radio and TV, and with the tremendous discoveries being made in physics at that time. Also, it was a challenge.

Interviewer: It sounds like you have always been a hard worker. Do you have any hobbies or other ways of relaxing?

Dreschhoff: I travel quite a bit, and can often combine my work and my hobbies. I like to ski and go kayaking. During the summer I swim, bike and play some tennis. I really enjoy music, and have quite a record collection, although I don't play an instrument myself.

Interviewer: You have a fascinating life. How about arranging for me to go along on the next expedition to Antarctica - as a reporter, not a scientist!

CONTENT QUIZ

"Ground control to Apollo 55 - test conditions: Go - answer each question correctly to get full points for the number (e.g. 10 = 10 points) - Standby for countdown - "

10 - Explain why and how transportation from New Zealand to Antarctica is different in November than in January.

9 - Describe the problem of interplanetary dust and how it was handled on Apollo 11 and Apollo 12.

8 - Compare the structure of American and German school systems.

7 - What was the point of the story Dr. Dreschhoff told about the construction workers in Antarctica?

6 - Name three radioactive elements commonly found in rocks.

5 - Name five leisure activities Gisela enjoys.

4 - Define retrorocket.

3 - About how old would you estimate Dr. Dreschhoff to be?

2 - In what country does Gisela Dreschhoff live?

1 - What branch of the service assists the National Science Foundation in expeditions to Antarctica?

0 - Add up your score after the teacher grades your quiz.

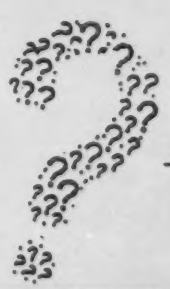
BLAST OFF! - 51 - 55, you are on your way

46 - 50, minor mechanical adjustments needed

41 - 45, refuel

36 - 40, danger

below 36, scrap the mission - reread and start the countdown over



ANSWERS TO CONTENT QUIZ

10 - short essay

9 - short essay

8 - American schools have six or seven years of grade school, two or three years of junior high and three or four years of high school. German schools have four years of grade school and nine years of high school or nine years of grade school and no high school.

7 - It is more important to be highly committed to your work than to be strong and muscular, to succeed in Antarctica.

6 - radium, thorium, potassium or uranium

5 - skiing, kayaking, tennis, swimming, biking, listening to music

4 - A retrorocket fires in the opposite direction of the missile on which it is carried.

3 - If she were 6-10 during World War II, she was probably born around 1933. Also allow for someone figuring from WW I.

2 - United States

1 - Air Force

WORDS TO KNOW

I. Choose the one word that can fill each blank in each group of sentences, A-F. Note that all words will not be used.

radius	remote	reactor
combustible	isolated	accelerator
transport	exposure	regulator

A. 1. There is not even a _____ chance that she will fail.

2. The child operated the race car by _____ control.

3. Antarctica has many _____ stations.

B. 1. If the airplane is not working, how will we _____ the supplies?

2. The public _____ system needs federal funding.

C. 1. The physics department has purchased a new _____ to study radioactivity.

2. It was a very one-sided conversation; I was really only a _____ to her comments.

D. 1. Sound the horn - the _____ is stuck!

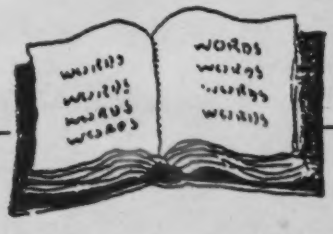
2. That nerve acts as the _____ as a boxer decreases his reaction time.

3. The machine that moves particles at high velocities is called the _____.

E. 1. If the diameter is 20 feet, the _____ must be 10 feet.

2. She broke her _____ playing soccer.

3. There were only fifteen families in a fifty mile _____ in that isolated part of Montana.



WORDS TO KNOW

F. 1. It appears from the darkness of the picture that your _____ time was insufficient.

2. A person unprepared for the elements could die of _____ in Antarctica.

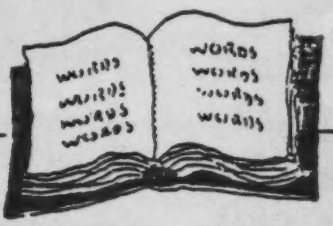
3. It must have been my early _____ to nursery rhymes that made me enjoy poetry.

4. Make sure this plant has a sunny location, perhaps a southern or western _____.

II. The prefixes "inter" and "intra" are often confusing. Read the definitions, and then use the following words correctly in sentences you compose.

inter - between or among two or more components
intra - within one component

intramural	intramuscular
interplanetary	international
intrastate	interstate
intermediate	interlude



IDEAS FOR WRITING

For the following activities, pretend that you were the interviewer in the profile. You are not only the interviewer, but also the editor and chief writer for a popular little science magazine called Explorer's Weekly. The format for your magazine is similar to other weeklies like Time, Newsweek and Sport's Illustrated.

1. Write several "Letters to the Editor" about articles in "past" issues (e.g., the recent space shuttle, bionic limbs, cut-backs in federal funds for exploration).

2. Write the lead article about Gisela Dreschhoff. Use the profile, but write the article in condensed (about two pages) report format.

3. Write a companion article (to #2) about radiation. Discuss alpha, beta and gamma rays, measurement of radiation, and dangers.

4. Write an editorial page exploring your views on requiring biology, chemistry and physics of every high school student.

5. Write a "People" section made up of brief interview accounts of scientific encounters - funny, memorable, educational, motivating - by classmates, teachers, school personnel, etc.

6. Write a science-fiction story about an expedition to Antarctica.

IDEAS FOR PROJECTS

1. Class Project. Set up a physics experiment to enter in your local science fair or to present to other classes in your school. The library will have books with excellent suggestions for science projects; pick one related to physics. One such experiment is detailed in the World Book Encylopedia, P volume, in the article on physics. It involves building a diffusion cloud chamber: "The purpose of this project is to see the action of atomic particles by observing the trails they make in the vapor of a diffusion cloud chamber. Cloud chambers are a basic tool of modern physics."

   Select committees for your project. Possibilities include:

   a. gathering/ordering materials
   b. setting up experiment
   c. background research
   d. photography
   e. presentation

2. Small Group Project. Prepare a learning center with "Physics" as your theme. Be sure your center is attractive, motivating, and well stocked with reference books, biographies, articles, and related magazines. Include activities, games, reading material, and/or quizzes on the following topics:

   a. Women in Physics (e.g. Marie Curie, Maria Mayer)
   b. Names that Live On (e.g. Ampere, Fahrenheit, Ohm)
   c. What Physicists Study (e.g. heat, light, sound, atoms)
   d. Careers in Physics (e.g. teaching, research, business)
   e. Milestones in Physics (e.g. Newton's Laws, Edison's inventions, Einstein's theories)

3. Individual Project. Design a cover for your Explorer's Weekly. Illustrate the magazine with drawings or photographs.

Gisela Dreschhoff studied the radioactivity of Antarctica's rocks. Have students read the Profile about Cynthia Dusel-Bacon to gain another perspective of geology fieldwork. Students can do their own geology investigations by performing the perc test which is described in COMETS Science's Soil.

COMETS: PROFILE

MARGARET DRAKE:
Mechanical Engineer

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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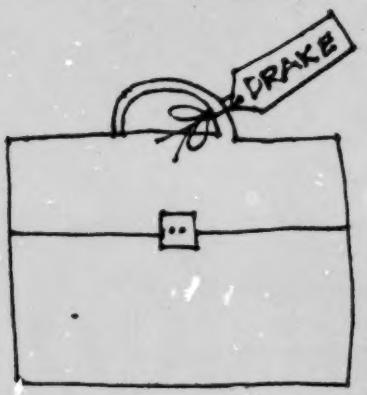
Margaret Drake

by Catherine Matthews and Ruth Noyce

When she is teaching, Margaret Drake, university professor, teaches about the mechanical action of heat. When she is consulting in the industrial world, Margaret Drake, mechanical engineer, solves problems related to heat and motion. Her speciality is thermodynamics ("thermo-" meaning "heat" and "dynamics" meaning "motion.")

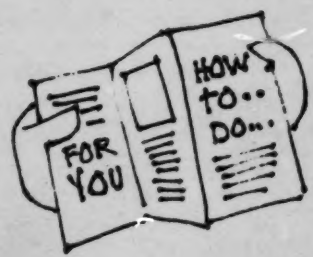
Margaret considers herself to be a teacher first, and a mechanical engineer second. She has been teaching mechanical engineering in universities for more than twenty years and finds teaching especially stimulating. She enjoys thermal sciences (the laws that govern the relationships between heat and work) and it is her greatest desire to instill her enthusiasm for this subject in her students. She teaches thermal sciences in the mechanical engineering department of a university and environmental systems (emphasizing heating, ventilation, and air conditioning) in the School of Architecture.



"My fascination with thermal sciences was something that just struck my fancy as a third-year engineering student," says Margaret. "I really found my home in thermodynamics after two years of rather tedious and unexciting pre-engineering courses and foundation work."

As a visiting professor and research associate at a large university, Margaret currently has primary responsibility for establishing an Energy Analysis and Diagnostic Center. The center is designed to serve small and medium-sized industries with less than two hundred employees. A team of mechanical and architectural engineers affiliated with the center will recommend ways for such industries to reduce energy usage. The project is new and funded by the Department of Energy. The center will serve about 150 plants within a fifty-mile radius of the university.

Margaret has prepared a brochure to describe the services of the new center for plant managers. It will be distributed to all small/medium industries within the designated areas served by the center, and it will contain the center's recommendations for curbing energy consumption in such plants. When a plant manager indicates interest in these recommendations, the center's research team will go into the plant and look at its operation. The team will study many parts of the plant's heating and cooling systems, including the gas, electric, oil, water and utility costs. Cost-cutting suggestions from the center's team might include modifying existing equipment, adding insulation, adding controls, utilizing wasted heat, and eliminating sources of wasted heat. The center should be effective in helping industries save both energy and production costs.



When asked about her stand on the many controversies surrounding energy and energy utilization, Margaret sums it up in a few words. "I try to involve myself in these controversies, because all the various forms of energy have both their places and their problems."

She is very pleased with the relationships she has helped to build between the university and the community. Margaret likes to take her thermodynamics students out into the real world of mechanical engineering, whenever possible. When she finds herself too busy to take on consulting jobs, she will often design a special project with several students. The students do the consulting and the department gets a stipend.

"This is great," Margaret explains, "because both sides benefit. The students get to work in their chosen field, solving problems for others. The clients get to maintain valuable contacts with up and coming mechanical engineers who are now university students."

Because of the fine reputation Margaret and her entourage of university "engineers" have built for themselves, they are called in on emergency basis now and then. In one instance, the occupants of an underground house in a small town near the university were tossing up their heads in futility as winter approached. The heating system in their newly-constructed home was not functioning properly and expert assistance was needed. Margaret and her students answered the family's S.O.S. by applying their thermodynamic know-how to the solution of the problem, designing a heating system capable of making the underground dwelling a comfortable place to be in the coldest weather. Needless to say, the owners of that home are thankful that some mechanical engineers have a special interest in energy utilization, and a willingness to share their expertise.

When asked how it feels to be one of only a few women in the mechanical engineering field, Margaret remarks, "I am so used to being the only one that it doesn't bother me." She explains that engineering seemed to be the right college major for her because she enjoyed mathematics and physical sciences in high school. Her father, a high school English teacher, encouraged both Margaret and her brother to attend college.

"My family emphasized that they wanted me to do whatever I would be happy doing, so I felt their support in my decision to enter the mechanical engineering field even though it was not a traditional career choice for a woman," comments Margaret. "My parents were able to pay for my college education, and I lived at home during the summer, where I was employed."

Her advice to younger students who are interested in becoming engineers is to take all the math and science courses they can get. She also considers

it especially important to learn how to write clearly and concisely. "Communication skills are very important for the engineer," she adds.

While engineering dominates Margaret's professional life, it does not engulf her social life, despite the fact that her husband is also an engineer (a chemical engineer with DuPont). Because they are the parents of four children, family activities have a high priority in their lives. Margaret usually prefers part time work rather than full time because it allows her to participate in church activities and cultural events. She enjoys recreational reading and educational experiences, such as the German course in which she is presently enrolled.

Although Margaret values the freedom of time to pursue her many interests, her commitment to teaching is strong. This dedicated teacher's motto is "What I Do, I Do Well." With her enthusiasm for teaching and her expertise in energy utilization, it is likely that Margaret Drake will be in demand for many years to come - as a teacher <u>and</u> as a mechanical engineer.

CONTENT QUIZ

1. What is the meaning of "thermodynamics?"

2. What university courses does Margaret Drake teach?

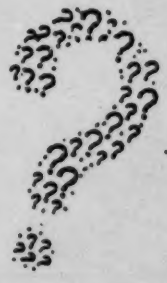
3. Describe the services of the Energy Analysis and Diagnostic Center.

4. How might the center's team suggest cutting energy costs?

5. What subjects should high school students interested in engineering careers take, according to Margaret?

6. Describe Margaret's family.

7. How does Margaret prefer to spend her free time?



ANSWERS TO CONTENT QUIZ

1. The mechanical action of heat

2. Thermal sciences and environmental systems

3. Recommend ways for industries to reduce energy usage and cut utility costs

4. Modify existing equipment, add insulation, add controls, use wasted heat, or eliminate sources of wasted heat

5. Math, science, and writing

6. Her husband is a chemical engineer for DuPont; they have four children

7. Family activities, church and cultural event, reading, educational experiences

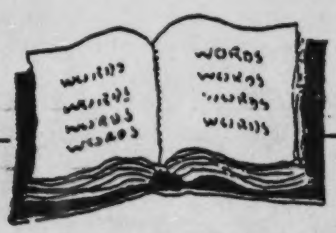
WORDS TO KNOW

1. How many "heat" words do you know? Find the prefix "therm-" in your dictionary and make a list of as many "heat" words and their meanings as you can find:

   thermometry . . . the measurement of temperature

2. Now do the same dictionary search for "motion" words beginning with the prefix "dyna-", making a list of those words and their meanings:

   dynamic . . . relating to physical force or energy



IDEAS FOR WRITING

1. "There is danger that thermal pollution could mean the end of the salmon population in the northwest United States." Write an essay explaining the term "thermal pollution" and its possible effects.

2. Which of the controversies about energy utilization concerns you most at the present time? Choose one form of energy to investigate and present your conclusions about the use of it. Examples: water, fossil fuels, nuclear energy, solar energy, thermal energy.

3. Write a news story about the day when an energy power blackout occurs in a large city. Pretend that you are a reporter sent to the scene of the power blackout from a neighboring city in a mobile unit to cover the disaster for your newspaper.

4. Research the topic of "insulation" and write a paper explaining how it works to cut heating and cooling costs.

5. Write the script for a television news program in which the following people are being questioned by citizens of a community who have just discovered nuclear wastes have been dumped near their town: the mayor; representatives of the company accused of dumping the wastes; doctors from the health department; owners of the disposal company; and operators of the dump. Choose classmates to play the various roles and present the show to your class.

IDEAS FOR PROJECTS

1. Investigate "geothermal" energy. Draw a diagram of a geyser or hot water spring to use in demonstrating to others how steam is produced. Explain how steam can be used to generate electricity.

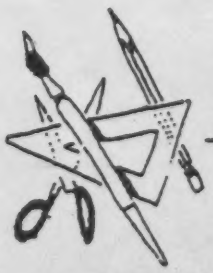
2. Make a list of all the ways you can think of to get from one place to another without using up an energy resource. Ask some friends to do the same, and compare lists.

3. Conduct a survey of your school, listing the ways energy is being conserved and the ways energy is being wasted. Make some recommendations of your own about how energy might be conserved in your school and give them to your teacher.

4. Find out how a passive solar home operates and prepare a diagram to use in explaining the process to your class.

Find out about the insulating properties of various materials by measuring the temperature of cups of hot water surrounded by, say, styrofoam, sawdust, or shreaded paper and seeing how long it takes each cup of water to drop 50°. COMETS Science's Energy has more detailed directions for this and related activities. Ask an engineer to come to class to relate their own work to this or another activity found in Energy.

Place a plastic bag inside a can or jar (a two pound coffee can, for instance). Allow the bag to overhang the rim of the jar or can and seal the bag to the jar with a rubber band. Pull up gingerly on the bag. It is difficult to do so because the external air pressure holds the bag in the jar. COMETS Science's Through the Air has additional directions and a diagram for this activity. Invite a meteorologist, pilot, or engineer to class to do this activity with students and to talk about their use of similar scientific concepts in their careers.



COMETS: PROFILE

JOAN BRUNFELDT:
Doctor
of Internal Medicine

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Joan Brunfeldt

by JoBeth Allen

Report card day. The young girl had always loved the excitement of running home with that envelope containing what her teachers thought of her. Sometimes she would try to discipline herself not to look at the card until she was home, but she was never able to be that patient. Usually, she would draw the card out slowly, reading one line at a time, until there appeared a complete row of A's, like seven or eight tiny presents. On several occasions she had been overjoyed with plus marks usually in math and reading. The four minuses (she remembered each vividly) had been from the same teacher, a grouchy old man who had once called her a smart-aleck.

Today she walked home. Her friends alternated between moans and exultations over their recorded marks. "My mom ain't goin' to believe a B in conduct - bet I get a dollar for this card!" "That old witch gave me a D in geography, just because I didn't memorize the state capitols." "My old man said he only got C's in arithmetic. Is he ever gonna be proud of this A." "Don't need to ask Joan what she got - she always gets all A's." She joked half-heartedly, ignoring the remark.

She opened the back door of her house, entered the kitchen, and hesitated. Conflicting emotions struggled within her. "Brownies. Mom made them especially for today. She'll be disappointed. Dad will really be upset with me. I'll just go to my room - tell them later -" Joan's mom entered mid-thought, her face lit with its usual welcoming smile. Joan ran the few steps it took to bury her unhappiness in her mother's understanding arms. "Only one in five years . . . sorry . . . just don't understand that stuff . . . it's only a grade but . . ." she sobbed.

Eighteen years later Joan Brunfeldt was able to point to that day in Bartlesville, Oklahoma as one of the important events in her becoming a doctor. Her first B had been in a fifth grade science course. "I remember it upset me so much that I thought, well, I'm just going to tackle this. I'm going to do well in it even though it's harder for me than other courses like English and math. It became a challenge."

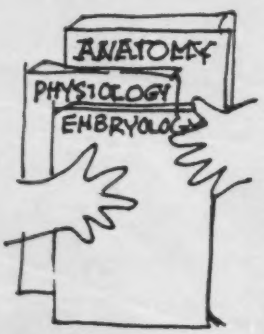
The challenge of mastering science led Joan eventually to medicine; however, the route was not direct. In junior high and high school, biology was a main interest. "For awhile I thought I wanted to work in a laboratory. I was especially interested in viruses and how they cause disease, both infectious and cancerous." By the time she reached college, Joan realized that research was too impersonal for her. She considered careers like medical technology and nursing, attempting to combine her interest in science with her people and service orientation. The thought of being a doctor, an obvious choice, scared her. Joan recalls, "I didn't think I was good enough. Male friends in my college classes were very cocky. As it turned out, a lot of

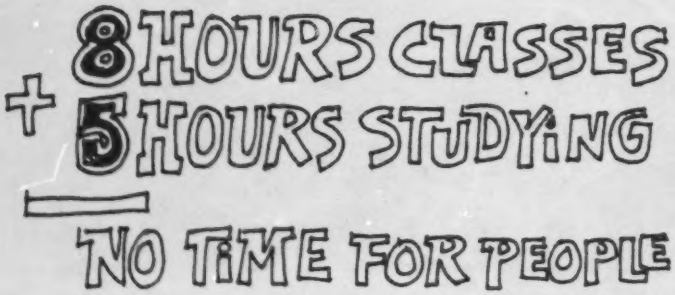
them didn't make it. I think one of the biggest problems women have in choosing medical careers is lack of self confidence."

It wasn't until her senior year that Joan decided to go to medical school. She was supported by her father, who had always encouraged his daughters to excel, and by fellow students and teachers. Dr. Brunfeldt points out that many students do not reach the decision to become doctors until later in their college careers. Is that delay detrimental? Joan thinks not.

"It is a common misconception that incoming college students declare their major as pre-medicine. You have to have another major, preferably something not scientific. I majored in German and microbiology. People in medical schools feel that if you become an expert in some other area besides medicine, you are a well-rounded person. Of course there are some pre-medical requirements in addition to your major, such as biology, chemistry, microbiology and a little math."

Once these courses had been successfully completed and the decision to enter medicine made, Joan took a medical school admission test. The eight hour examination covered science, math, vocabulary and general information. Her scores must have been high, because admission to medical school is notoriously difficult. However, Dr. Brunfeldt believes more emphasis is placed on personal qualities brought out in an interview. "You have to have common sense," she asserts. "You have to be willing to work hard and to really care about your patients. You don't have to be brilliant. If you have some level of knowledge and expertise, then you'll be a good doctor."





That "level of knowledge and expertise" is not easily attained. Medical training is rigorous. Joan took two years of course work after entering medical school. She studied anatomy, physiology, and embryology, never seeing a patient. A daily schedule of eight hours of classes and five hours of studying leaves little time for people, and some students become discouraged. Joan enjoyed the last two years of medical school much more. She describes this part of her training with enthusiasm.

"Initially, you're sort of low man on the totem pole. You spend a lot of time running to

the lab, taking specimens and drawing blood. It's in those years that you learn a lot about getting along with other people. Often the nurses know more than you do at that stage and can really help you. You learn efficiency, because if you don't, you'll be there sixteen hours a day instead of twelve. You work your way up to tasks that require more responsibility. You get to take care of some patients almost completely by yourself. But all this time, you are directly supervised by interns, residents, staff doctors and professors."

Internship is the next phase of medical training. Dr. Brunfeldt remembers the shock of going from partial responsibility for two or three patients to almost total care of a ward with fifteen to twenty people. "There are rounds each morning with the professor where you're supposed to know everything about each patient. You must know how much urine they made overnight, what their blood count was that morning, all those things." New interns understandably often feel overwhelmed.

Dr. Brunfeldt thinks that increasing numbers of women in medicine have taken some pressure off the intern phase. "In some programs, interns actually did things to make each other look bad. There was an attitude of superiority and competition. With more women in the field, the atmosphere is friendlier. In our program, we all tried to help each other out; we were really close." That camaraderie is especially important because of the stress and demanding pace. "You may feel depressed that you haven't read a newspaper in five days, or that you haven't been to a movie or had a really good hot meal or an uninterrupted night's sleep in a long time. But the fact is that all your friends are doing it, and they're living through it. That really helps!"

Joan did not escape the effects of the "intern ordeal." Toward the end of the internship, she became depressed. She was physically and emotionally drained. Her solution? Ballet lessons! The physical exercise and time away from medicine were effective antidotes. Since then, Dr. Brunfeldt has been involved with running (three or four miles a day), reading (good novels as well as "trashy" ones), sewing and remodeling her home. These activities keep medicine from consuming her life.

After completing her internship, Dr. Brunfeldt chose internal medicine over other areas of specialization. This decision was based on her preference for working with adults and her interest in the scientific problem-solving approach of internists. She explains, "If somebody comes in with a fever and swollen glands, you don't know if it's just an infection or something really serious like leukemia. It's like a puzzle. You examine them, asking all sorts of questions. You run lab tests. Then you have to put all these isolated facts together and make a diagnosis." Sometimes these decisions are quite dramatic. "What really turned me on in medicine was having patients come into the emergency room in shock or unable to breathe, almost dead, and being able to bring them back."

These moments are the most rewarding aspect of a medical career. The worst thing about being a physician, according to Dr. Brunfeldt, is the constant pressure. Most of it is self-imposed. In fact, one of the qualities

looked for in new medical students is a compulsive nature. The problem with people like this, Joan admits, is that they are terribly hard on themselves if they make a mistake. "If I made a mistake as an artist, I would just chuck the canvas and start over. I can't do that with a human life."

Joan Brunfeldt loves being a doctor. She has several insights for others interested in choosing the medical profession. "I think people should have exposure to medicine before they go to medical school. Young people should volunteer for work as aides in hospitals, doctors' offices, or medical labs. In addition to several such experiences, Joan points to junior high and high school courses which were valuable for her. "Math courses gave me a way of solving problems in an organized fashion. A lot of things in my science courses I use directly. I can remember learning the different parts of the cell in school. I still need that every day in reading journals, because they talk about how they've discovered a part of the cell that makes a certain protein that helps fight against cancer." One of the biggest carry-overs from education is the enjoyment of reading. Doctors must constantly update their knowledge through reading medical journals.

Yet "book learning" is not the only, or even the most important, criterion. Joan emphasizes, "A lot of "B" type students turn out to be fantastic doctors. Although they may not have all the facts at their fingertips, they are able to look at a patient and the symptoms, put it all together, and figure out what is wrong. You don't have to know everything; you can't. The main things are to have common sense, to know where to go for help, and to have compassion."

Dr. Joan Brunfeldt personifies those criteria. And with the exception of an occasional "B," she wasn't too shabby on the "book learning" either!

CONTENT QUIZ

There are eight ways of inferencing (reading between the lines), according to some experts. Test your inference skills by

a) reading the profile
b) answering as many questions as you can without looking back at the profile
c) carefully re-reading the profile to finish answering the questions and to check your inferences

1. Supporting details -

   Does Joan's mother have a job outside the home every afternoon?

   How do you know?

2. Main idea -

   How did a negative experience in the 5th grade influence Joan's career?

3. Sequence -

   List the order of educational steps leading to Joan's present position.

4. Comparisons -

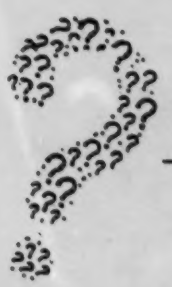
   Compare the way Joan handled stress during her internship with her report card day.

5. Cause and effect relationships -

   Support your agreement or disagreement with this statement: Joan was admitted to medical school on the basis of her admission test.

6. Character traits -

   List five adjectives that describe Joan Brunfeldt.



CONTENT QUIZ

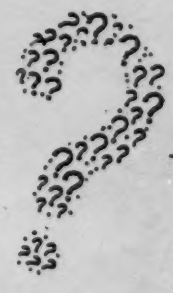
7. Predicting outcomes -

If Dr. Brunfeldt has made any career change ten years from the interview, it would most probably be

a) she will become a full-time cancer researcher
b) she will become a nurse
c) she will start a diagnostic clinic
d) she will become a pediatrician
e) she will open a ballet school

8. Figurative language -

How do you think a protein can "fight" against cancer?



WORDS TO KNOW

I. "-Ologizing"

There are many words that end with the suffix -ology, meaning "the study of."

For example,

dermat (skin) + ology = the study of skin
psych (mind) + ology = the study of the mind

a. These five "-ology" words were used in the profile of Dr. Brunfeldt. Use the dictionary to define each word as shown in the examples. Then write a sentence or two for each word, using a hospital theme.

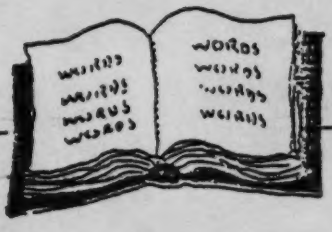
example: zoology = zo (animal) + ology (the study of) = the study of animals

"Dr. Jones, your training in zoology is finally going to pay off. Miss Piggy just checked in!"

1. biology = .
2. embryology =
3. microbiology =
4. physiology =
5. technology =

b. Now create five new "-ologies." For example, the study of cats might be "felinology."

1.
2.
3.
4.
5.



WORDS TO KNOW

II. Frick and Frack

You may often be more familiar with one form of a word than another, but the word you know can help you discover the meaning of the unfamiliar. Write sets of sentences using the words listed below.

e.g. Frick: I have a <u>vivid</u> memory of our canoe trip last summer.

Frack: What I remember most <u>vividly</u> is that you tripped getting into the canoe.

exult/exultations

infect/infectious

orient/orientation

concept/misconception

notorious/notoriously

expert/expertise

part/partial

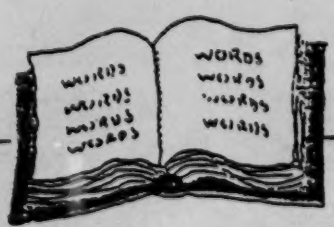
interrupt/uninterrupted

special/specialization

impose/self-imposed

excel/excellent

detriment/detrimental



WORDS TO KNOW

III. Dictionary Descriptions

There are times when the only way to learn an unfamiliar word is to use the dictionary. Look up underlined words to find their meanings. Then complete the sentences to write a description of yourself.

My name is ----------. I am ------- years old, ------ eyed with --------- hair, ------- tall. People tell me I look like ----------.

One thing I'm <u>compulsive</u> about is ----------.

My most <u>rigorous</u> school subject is ----------.

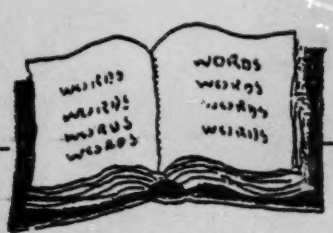
The best <u>antidote</u> for boredom is ----------.

I'd have to say I'm a <u>mediocre</u> ----------.

The only time I've felt <u>overwhelmed</u> was ----------.

I get a feeling of <u>camaraderie</u> when ----------.

My main <u>criterion</u> for myself is ----------.



IDEAS FOR WRITING

1. It is normal to take the point of view of the person speaking, or of the narrator, in a story. That doesn't always get at the whole "truth," however. Try to put together a whole picture of that day in the fifth grade when Joan Brunfeldt got her first B. Write a well-developed paragraph from the point of view (perspective) of each of these people:

    a. Mother Brunfeldt
    b. Father Brunfeldt
    c. Joan's science teacher
    d. Joan's friends

2. Read several encyclopedia entries on women doctors (e.g., Alice Hamilton, Susan La Flesche Picotte, Florence Sabin, Anna Shaw and Helen Taussig). Now take the role of a writer for the Whirled Book Encyclopedia in the year 2022. From what you know about Dr. Brunfeldt, and what you imagine her life will be from the date of the interview (1980), write a concise encyclopedia entry.

3. The most common reason for going to a doctor of internal medicine is pain. We think of pain as negative; no one likes to hurt. But imagine for a moment what it would be like if your body were incapable of feeling pain. Now write a complete adventure story about a new super-hero, the amazing "Wonder Bod." She feels no pain, a characteristic that creates many dangerous situations, as well as giving Wonder Bod supernatural powers. "The Adventures of Wonder Bod"

4. Start a "Dictionary of Diagnosis." The following procedures and instruments are possible entries:

    biopsy
    blood count
    bronchoscope
    electrocardiograph
    electroencephalograph
    fluoroscope
    gastroscope
    manometer
    Schick test
    thermography
    throat culture
    X-rays

IDEAS FOR PROJECTS

1. Class Project. Produce a comic book using the stories people wrote about the "Adventures of Wonder Bod." You will need illustrators, proof-readers, editors, content advisors, mimeograph experts, and lots of hard workers. A good way to start might be to have someone from a local newspaper or publishing company, or a journalism teacher speak to your class. Children in the lower grades will be delighted with your product - you might revive the nickel comic book! If you get really good, you might put out a new issue every month.

2. Small Group Project. Set up a diagnostic panel for your classmates' aches and pains. Those who are interested in participating will tell you their symptoms (sore throat, toothache, etc.), and you will discuss possible diagnosis with the official one. If there are students in the class with conditions such as diabetes, epilepsy, scoliosis, etc., they might be interested in helping you research a report to help the rest of the class understand their condition.

3. Individual Project. Read one of the biographies of Elizabeth Blackwell, the first woman doctor in America. Then do one of the following activities:

   a. Prepare a classroom bulletin board to instruct others about her life.

   b. Interview a woman doctor to assess both similarities and changes in training compared to Dr. Blackwell's.

   c. On a large poster board, illustrate a particularly interesting scene from the biography.

<u>Biographies</u>

(IN - intermediate grades, JH - junior high, SH - senior high, adult)

Clapp, Patricia. DR. ELIZABETH IN-JH
Lothrop, Lee & Shepard, 1974

Hays, Elinor Rice. THOSE EXTRAORDINARY BLACKWELLS IN-JH
Harcourt Brace, 1967

Story not only of Elizabeth, but also of her sister Emily, who followed her sister's footsteps. Emily became a physician and joined Elizabeth in their New York infirmary.

IDEAS FOR PROJECTS

Heyn, Leah Lurie. CHALLENGE TO BECOME A DOCTOR IN-JH
Feminist Press, n.d.

Easy-to-read biography with 32 period prints and many drawings.

McFerran, Ann. ELIZABETH BLACKWELL: FIRST WOMAN DOCTOR JH-SH
Grosset

Chambers, Peggy. A DOCTOR ALONE SH-ADULT
Abelard-Schuman, 1958

Covers Blackwell's early childhood in Bristol, England and her struggles to enter medical school and to start a medical practice. Well-written and documented. Includes information on the social and political situation at various times in Blackwell's life.

Wilson, Dorothy Clarke. LONE WOMAN: THE STORY OF ELIZABETH BLACKWELL Little, Brown, 1970 ADULT

A comprehensive, in-depth biography. Well researched.

Have students read "Women and Medicine" in COMETS Science's Fit N' Trim to learn about contributions made by Drs. Virginia Apgar (a test of babies' physical fitness), Helen Brooke Taussig (a method of saving "blue babies" by means of a heart by-pass), and Frances Kelsey (prevented birth defects by having the drug thalidomide recalled from use by pregnant women). Students could also read about Dr. Julie Glowacki who pioneered work for improved bone transplants (see Bones and Balance), Dr. Florence Sabin whose work covered many areas including public health (see Body Detectives), or Drs. Rachel Fuller Brown and Elizabeth Hazen who developed the antifungal drug, nystatin (see Pharmacy). Students could report to the class their findings.

Joan Brunfeldt commented on how her work is like solving a puzzle. Students may enjoy tangrams, a little different kind of puzzle, which are described in COMETS Science's Third Dimension.

COMETS: PROFILE

CYNTHIA "SAM" BOOTH:
Athletic Trainer

COMETS

Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
Copyright, 1982

Cynthia "Sam" Booth

by Jane Lucas

Cynthia "Sam" Booth knew where she was headed with her young life. As she tore along dribbling, running, shooting - everything a dedicated player does on a basketball court - she dreamed of playing on a winning Olympic team. However, a sprained knee which eventually required surgery shattered her dream.

At about this same time, Sam had to wrestle with some career decisions. She thought about becoming a coach or a teacher or a physical therapist. She changed majors three times. It seemed she could not decide. Despite all the problems, though, the disappointed athlete and the indecisive student have merged into the successful athletic trainer and the determined advanced degree candidate in physical education Sam is today.

Sam comes from a small town and a large family. As she was growing up, sports were her primary interest, but life sciences appealed to her as well. Anything related to the body's workings, like anatomy, fascinated her. When Sam's knee problems ended her active participation in sports, she ultimately turned to a newly instituted program at her college, athletic training, to keep her close to sports and science.

During her junior high and high school years, the idea of a career in this field had never occurred to Sam. "I didn't even consider athletic training at the time," she recalls. In fact, like many people, she did not have a clear understanding of what a trainer is. "Usually the athletic trainer in a high school situation is a water boy - especially in those schools that don't have the money to fund the position," Sam points out.

In college, of course, Sam found out that an athletic trainer must be much more than a water boy. She took a wide range of courses, from biology and physiology to kinesiology and psychology. Most of her classes were medically oriented. In addition, to classwork, Sam had to accumulate more than 200 hours of clinical experience dealing with conditioning programs, treatments for various injuries, and the like. She became proficient in ultrasound and ice treatments. She learned how to test a joint, how to locate the point of pain, and when to suggest a

whirlpool. She learned the importance of hygiene and nutrition to an athlete. In short, Sam became, as she puts it, " . . . a person that's in charge of rehabilitation, emergency medical care, and mainly, prevention of athletic injuries - an athletic trainer."

Sam is quick to add that a trainer's job is not the same as a doctor's job. A trainer's responsibility is " . . . not to diagnose, but to evaluate an injury. Diagnosis is up to the doctor."

In her job as trainer in charge of seven women's sports at a major university, Sam must motivate her injured athletes in their rehabilitation programs. "Once someone gets hurt, it takes everything out of her," Sam says. "'Rehab' is boring and hard, but it must be done."

Here is where rapport with the coaches and doctors is quite important. "A lot of times I'll have kids that come in and tell me one thing and tell their coach another thing," Sam sighs. Maybe the discrepancy is about how long the player must remain inactive or about how the injury must be treated. At this point, Sam and the coach must discuss the problem compatibly. Then, if there is still a problem, Sam has the team physician or a university hospital staff doctor see the athlete. A medical evaluation will usually settle any difference of opinion on treatment.

Sometimes the doctor will prescribe medication for an athlete. Sam, on the other hand, cannot prescribe medication. Dispensing aspirin for a cold or flu is her limit in this area.

Evaluating injuries is another matter, however. When an athlete comes in with an arm injury, for example, Sam begins her approach to the problem with an orthopedic evaluation. If she suspects a muscle problem, she administers various tests to find out which muscle could be involved. "The application of cold treatments to the local area is very important. 'Local' means the area of injury. These treatments are in the form of ice pack, cold whirlpool, ice immersion in a bucket of ice cups, and should be administered immediately, or at least within the first 24-48 hours of injury occurrence."

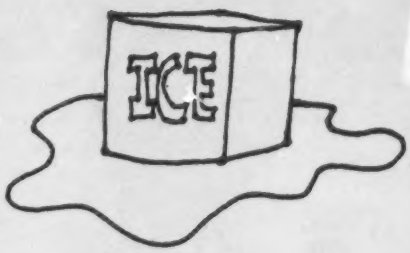
Sam uses the warm whirlpool for postacute conditions of sprains, strains, and contusions. Chronic muscular problems are best relieved with the application of moist heat or warm whirlpool treatments. These two treatments also aid in warming up an area prior to practice or competition.

The ultrasound machine produces deep heat if that is needed. Sound waves oscillate off a crystal inside the sound head and penetrate the

tissues. This treatment works best at junctions of bone and muscle. Sam does not allow the athletes to touch this machine since it must be used with extreme care.

She also has an electric galvanic stimulator, which is a microdyne machine used frequently for fluid movement. If Sam cannot get the swelling out of an arm, for instance, this machine can pump the fluid out and break up muscle spasms. Again, however, she urges that extreme caution must be used with these highly technical and complex machines.

Of all the treatments Sam uses, she relies the most on cold ones. "I'm very ice-treatment oriented," she declares. "With ice you can never go wrong. If there's the least little bit of fever in the area, and you put heat on it, that's going to inflame it more. With ice, that precaution in unnecessary."



A typical day on the job for Sam begins around 8:00 in the morning. From then until noon she schedules evaluations of injuries. During these evaluations she decides whether one of her treatments is indicated or if the athlete should see a physician. The afternoon - and sometimes part of the evening - Sam reserves for treatments, paper work, attendance at the various sporting events her athletes are participating in, and her own school work.

Does this demanding schedule leave any time for relaxation? Sam's free moments are usually spent outdoors. She loves to camp, and she especially enjoys summer evenings when she can sit outside and watch the traffic move lazily by or the flags on the campus buildings flutter gaily in the warm breeze. "I don't like crowds," Sam says. Being with one or two people in a quiet setting is more her style.

Her style in the training room is strictly professional. She tells her female athletes that, if a male applicant is better qualified than any female applicants for the assistant's job that will be filled next year, she will hire him. She also insists that her student trainers on duty wear specified matching shirts. "It looks good for the program, it looks good for the university, and it looks good for the athletes to see that," Sam observes.

All this professionalism does not mean that Sam is aloof or dictatorial. "I've been on both sides of the fence," she says. "Participating in basketball all those years - now I'm a trainer. I see these athletes from all sides. I feel that I can relate to them on a personal basis and still maintain my professionality."

Sam sees the job opportunities in her field as promising - perhaps more so for women than for men - because of the projected growth of women's athletic programs at all levels. Being interested in sports is a key, of course, to a possible career in fields related to sports medicine, but an interest in sciences is equally important.

"The best way to start," Sam says, "is as a student trainer. But," she warns, "there's not much pay when you're a student trainer - if any at all. It takes a lot of hard work and dedication."

Hard work and dedication are vital parts of Sam Booth's life. Dealing with disappointment, making an important career choice, and coping with a complex job at the same time that she is going to school have not been easy for Sam. Nevertheless, she has persevered.

"I went through some tough times trying to adjust, trying to cope, dealing with my new ideas," she admits.

Sam's philosophy of life is simple. She believes that you can never encounter a bad experience if you learn something from it. She also believes that whatever happens is meant to happen.

These beliefs are especially evident when Sam speculates about her future. "I like working at the collegiate level," she says. Also, I wouldn't mind getting the chance to be a trainer for the Olympic teams."

Obviously, that long-ago dream of the young basketball player lives on. Cynthia "Sam" Booth may make it to the Olympics yet.

CONTENT QUIZ

1. Why is Sam Booth no longer an active basketball player?
2. What is a local cold treatment?
3. What are the chief responsibilities of an athletic trainer?
4. For what purpose does Sam use the warm whirlpool?
5. How many sports is Sam in charge of as an athletic trainer?
6. How does Sam like to spend her free time?
7. Why are the job opportunities in Sam's field so promising for women?
8. What interests are related to a career as an athletic trainer?
9. What is the best way to start towards a sport medicine career, according to Sam?
10. Describe two of Sam's basic beliefs about life.

ANSWERS TO CONTENT QUIZ

1. She injured her knee.

2. Cold treatments to the area of injury, using ice whirlpool, ice pack, or ice immersion

3. Rehabilitation of the injured; emergency medical care; prevention of athletic injuries

4. For muscular problems needing relaxation treatment and for warming up prior to practice or competition

5. Seven

6. Camping; sitting outside; being with one or two people

7. Women's athletic programs at all levels are growing.

8. Sports and science

9. As a student trainer

10. (a) A bad experience can help a person learn
    (b) Whatever happens is meant to happen

WORDS TO KNOW

1. Sam Booth uses the words "ultrasound" and "microdyne" in her occupation. In the spaces below, list other words beginning with the prefix "ultra-" and other words ending with the suffix "-dyne", with their meanings:

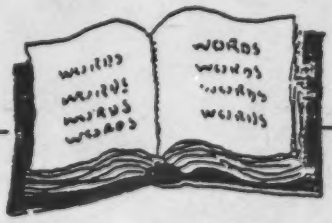
ultra-	Meaning	-dyne	Meaning
ultrasound	----------	----------	----------
----------	----------	----------	----------
----------	----------	----------	----------
----------	----------	----------	----------

Draw a conclusion about the meaning of:

1. the prefix "ultra-" ----------
2. the suffix "-dyne" ----------

2. Sam's use of the word "rehab" instead of "rehabilitation" illustrates word-clipping, a process by which words are often shortened by the users of a language. Find the original words from which the following clippings were made:

	Meaning		Meaning
auto	----------	brig	----------
gym	----------	medic	----------
bus	----------	burger	----------
math	----------	copter	----------
curio	----------	taxi	----------
phone	----------	ad	----------
lab	----------	exam	----------
lit	----------	tarp	----------



WORDS TO KNOW

3. Each sport has unique language, or jargon, of its own. Common words take on special meanings within the context of one sport. For example, "dribbling" and "shooting" are part of Sam's basketball jargon. Choose one of these sports and list as many words from its jargon as you can: golf, baseball, basketball, football, hockey, tennis, soccer.

Name of Sport ----------

Word	Meaning	Word	Meaning
----------	----------	----------	----------
----------	----------	----------	----------
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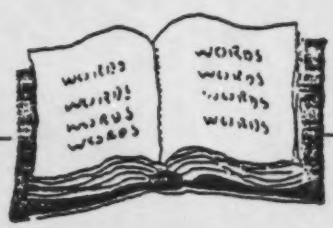

IDEAS FOR WRITING

Paragraphs:

1. Explain Sam's statement that a trainer's responsibility is " . . . not to diagnose, but to evaluate an injury. Diagnosis is up to the doctor."

2. Find out how microdyne machines like the electric galvanic stimulator work and write an explanatory paragraph.

3. Explain how an ultrasound machine produces deep heat, and what the machine is used for by athletic trainers.

4. Sam dreamed of playing on an Olympic team. Do you have a dream? If so, write about it.

Themes:

1. Describe one or two of your basic beliefs about life, comparing your philosophy with Sam Booth's.

2. What if Sam had not been injured? Use your imagination, and write a fictional account of what might have happened to her. Tell how her life might be different now.

3. Write about a personal experience of your own that is related to one of these statements from Sam's philosophy of life:

   A. "A bad experience can help a person learn."

   B. "Whatever happens is meant to happen."

IDEAS FOR PROJECTS

1. Research the history of basketball, and design a timeline poster to show some of the major events in the development of the sport.

2. For one week, clip articles from the sports section of a newspaper which describe injuries to athletes. Analyze your findings and draw conclusions of your own regarding: the most common types of athletic injuries; the most serious of these athletic injuries; and the most dangerous competitive sports.

3. Trace the safety improvements in the football helmet during the past fifty years. Present your information in a series of diagrams.

4. Make a list of all the different words sports writers use to say "won" or "lost" in the headlines of their articles. Use the Sunday sports section of a newspaper for this project, especially during major sport seasons.

Have students stand with their right feet and hips against the wall. Ask them to lift their left feet and remain standing. They can't! Their centers of gravity are too far from the wall to be supported by their right feet, so they fall. Invite a coach or trainer to class to lead this activity and talk with students about other examples from their own careers where they need to understand physical and biological laws in order to do their jobs. COMETS Science's Bones and Balance has additional directions for this and other center of gravity activities which relate to the body's functioning.

Just as Sam Booth sometimes has to be a detective to figure out what is slowing up her athletes, so do many other health career people have to be detectives. The purple water from boiled red cabbage turns pink, blue, or green depending on the kind of chemical added to it. Medical technologists could lead students in using red cabbage juice and relate how they use other chemical tests to detect the body's state of health. COMETS Science's Body Detectives tells how to use red cabbage juice and do similar activities.

COMETS: PROFILE

SHARON and KARAN BAUCOM:
Physicians

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Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Sharon and Karan Baucom

by Carole Spinharney and Ruth Noyce

KANSAS CITY, KANSAS -- Back in the 1950's, two little black girls were growing up in an average Kansas City home. Like a lot of little girls at the time, one of the identical twin sisters wanted to be a nurse, but it was just about that time when Sharon and Karan Baucom began to show they weren't going to think like all the other little girls in the neighborhood.

When Karan Baucom told her dad she wanted to be a nurse he said, "Why don't you be a doctor?" When she replied she had never seen a black lady doctor, he undauntedly told her she could be the first. And since little girls usually believe what daddys tell them, Karan knew she could become a doctor when she grew up.

Sharon Baucom-Copeland remembers the road to doctorhood a bit differently -- she irreverently insists that Karan got the idea because she liked the candy pills in a toy doctor's kit they got from the Salvation Army when they were kids. Sharon says she can't remember when she made the decision to be a physician -- "I just always wanted to be one."

What makes the story of the Baucom twins different from a lot of childhood dreams is that, against the odds of being female and black (which were pretty big odds at the time), they did it. Today Dr. Karan Baucom and Dr. Sharon Baucom, 25 years old, are both second year resident physicians at the University of Kansas Medical Center.

Karan is specializing in obstetrics and gynecology, and Sharon is a family practice resident. A younger brother, Baron, a student at Meharry Medical College, plans to become a surgeon. The three eventually will start a group practice of Baucom "docs" in Kansas City or Topeka.

The twins enrolled at K. U. in 1968. They were roommates, but not competitors, in college. Both worked hard enough to get accepted to medical school. They received their M. D.'s in the first graduating class from the University of Missouri-Kansas City Medical School in 1974.

"So many people told us it was impossible," said Karan, "that it made us determined to do it." There were a lot of "no's" from blacks, she said, because the twins were both black and female, but their mother and father were always behind them.

Karan resents the assumption made by some people that a black professional can't be an average person, but must be some kind of exception. "We need

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*This article was released to the press from the University of Kansas Medical Center Public Relations Office in 1976. It was written by Carole Spinharney.

to get out of the stereotype that only exceptional blacks get anywhere. And you get that from both sides," she said.

"I had a very realistic idea of being a doctor," Karan went on. She admits that when she was younger, the idea of becoming a physician was kind of an ego trip. "After all," she said, "it is a noble profession, still held in esteem, and with it comes a certain amount of social acceptance and prestige."

"Later," she said, "I realized I had a genuine concern for people. It's very important for me to help people -- not religiously or socially, but physically to make people healthy."

Karan sparkles when she talks about her speciality -- gynecology and obstetrics. The field is doubly good for her, she says, because it combines some surgery with something she really likes -- babies.

"In obstetrics," she said, "working with pregnancy, you're dealing not with one life, but with two -- and you get to fool around with babies. You know you have delivered life -- there's nothing like it. No matter how many times you do it, it's always different."

Sharon, as enthused about her specialty as Karan is about hers, is a true family physician.

"I like kids," she said, but she likes adolescents and adults, too. She thinks family medicine is a cross between many specialties, giving her a lot of variability in the patients she sees.

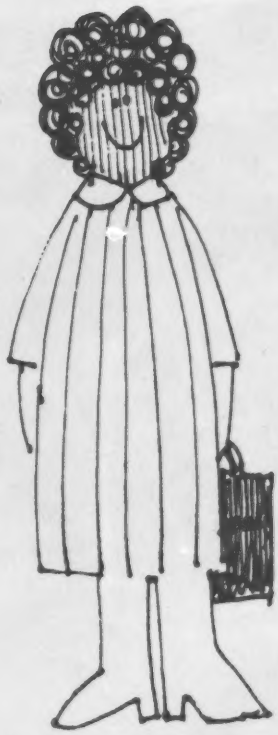
"I would call myself a jack-of-all-trades," she said. "I think continuity of care is important. I like to see what happens to a patient." As a family doctor, she enjoys the idea that she can deliver a baby and perhaps continue to see that child on into college, into adulthood and into having a family of his and her own. "The other specialties are important," she said, "but if I send a patient to see a specialist for his heart, he always knows his heart's not going to stay there - it's coming back to me. I'm really family oriented."

Sharon thinks she can help families by the kind of continuity of care offered in the K.U.M.C. family practice clinic. When she sees an entire family in the clinic, she is more aware of the financial or emotional pressures members of the family might be under. They are more likely to confide in her.

"They feel more comfortable with me than they might with some specialists who they might see only once," she explained, "and that makes me aware of a lot more."

Sharon is married to Elisha Copeland, a psychologist with the pediatrics department at the Medical Center. He is very supportive of her professional life.

"I have a husband who is independent," she said. "He's not afraid to cook dinner for himself or do the laundry, plus he's very protective and guards my privacy when I am at home. That helps a lot."



Sharon is chalking up other firsts at the K. U. Medical Center. She will be the first female resident to complete the family practice residency program, and, on a more personal note, she is the first family practice resident to become pregnant. "This is a new thing, too," she laughed, "and I'm fighting for pregnancy benefits for residents." She thinks maternity benefits by rights should belong to the male residents, too, since many of them don't have the time to enjoy their young families.

Sharon thinks bearing children is consistent with her future medical practice. "Kids and family practice go together, don't they?"

She admitted she showed a little favoritism to her pregnant patients. "I have patients whose babies are due at the same time as mine," she said, "and I just tell them my sister, Karan, can deliver if I can't."

Karan said being a woman had worked both for her and against her as a physician in obstetrics and gynecology. She believes women don't know enough about their own bodies, and she tells them frankly it is their business to become more aware of themselves. Both as a woman and a physician, she said she felt committed to talk to other women about their problems, to explain whys and wherefores of different treatments.

A few women have trouble accepting a woman physician in the traditionally male dominated specialty. One of Karan's patients said, "I've never had a woman doctor, and I'd prefer to have a male." Another time a black husband didn't want a black woman doctor delivering his wife's baby.

Other patients, however, were delighted to have another woman as their physician, and some refused to see male residents after being treated by Karan. She thinks whatever a patient feels is fine. If a woman wants a different doctor, that is her prerogative. "Above all," she said, "you should try to please the patient."

Sharon has many male patients in family practice. Some men still have a very traditional, stereotyped picture of women belonging in the home and are shocked to find they have an appointment with a woman doctor.

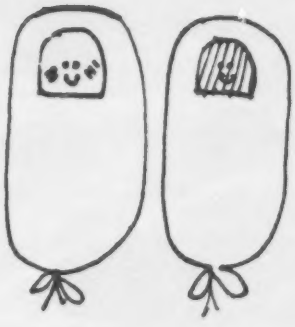
"I have to sense that and feel out their attitude, and then they have to put me above their traditional attitudes toward women. Your patient will be as comfortable as you are," she explained, "and I try to show all the confidence I feel. You don't advise the patient, you guide him; and you can't separate his mental attitude from his physical health."

After some initial shyness from many male patients, some become so comfortable with her matter-of-fact, professional manner that they request to see her in the clinic.

Sharon said the other family practice residents were "like big brothers to me. They've always treated me well. Everywhere I've been, the staff has backed me up completely."

Still to come for Sharon is a required rotation for third year residents in cities out in Kansas. She said that would be a first for her, since she would be going without her husband, and she, black, female and a doctor, would probably be a first for the town to which she is assigned.

"My basic philosophy is I don't ask for anything because I'm black," she said. She added that most people who showed surprise when shown into her office exclaimed not that she was their first black physician, but that she was their first woman physician.



When Karan began her Ob-Gyn residency, she was assigned to Topeka Stormont-Vail Hospital for a six-month rotation. She had never delivered a baby in medical school, but when she left Stormont-Vail, she was a veteran with 300 deliveries to her credit.

"I was there to learn, and if nurses, technicians, or aides could teach me, that was fine. They took care of me," she recalls, "and very tactfully."

Karan was only the second female to work with the group of Topeka physicians on a professional medical basis. "I acted very cautiously about my position as a female doc," she recalled. "Most nurses and technicians are women, and the doctors sometimes had to make a transition from dealing with nurses to dealing with me as a doctor. But I was never made to feel I was anything but a resident there."

At the Medical Center, she and another female resident have learned to live with the inconvenience of sharing call rooms with male residents or changing for surgery with nurses because most hospitals weren't planned with separate quarters for male and female M. D.'s. She's used to changing clothes in the bathrooms and knocking before she goes into a call room.

Although Sharon is married, she practices medicine as Dr. Baucom. Karan says she will always be Dr. Baucom, too. They think it is kind of a memorial and testimonial to the parents who always believed in them.

CONTENT QUIZ

1. What kind of medical specialist is Karan Baucom? Sharon?

2. Why did Karan Baucom become a doctor?

3. What were the chief odds against the twins becoming doctors?

4. How does Sharon describe her relationship with her male patients?

5. What does Sharon say about her basic philosophy?

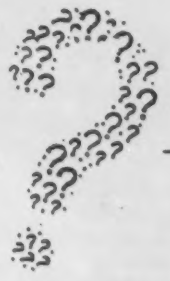
6. Why does Sharon practice as "Dr. Baucom" even though she is married?

7. Describe Sharon's husband.

8. Why does Sharon call herself a "jack-of-all-trades"?

9. What reasons does Karan give for enjoying the field of obstetrics and gynecology?

10. What inconveniences did the twins discover as female residents at the Medical Center?



ANSWERS TO CONTENT QUIZ

1. Karan is an obstetrician and gynecologist. Sharon is in family practice.

2. She considers it a noble profession, held in high esteem. She has a concern for people and wants to help them be healthy.

3. Being black and female

4. She tries to be comfortable and show confidence, guiding rather than advising the patient in a matter-of-fact professional manner.

5. "I don't ask for anything because I'm black."

6. As a memorial and testimonial to her parents who believed in her

7. She says he is independent, protective and supportive. He is a psychologist, who can cook and do the laundry.

8. She can deliver a baby and continue to see that child into adulthood. In family practice she works with the problems of entire families.

9. It combines surgery and delivery of babies, dealing with two lives.

10. There were no separate rooms for male and female residents or call room to change in for surgery.

WORDS TO KNOW

1. Medical Specialties

What other specialties are there besides family practice, obstetrics, and gynecology?

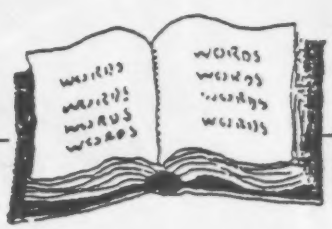
List as many specialties as you can find in the Yellow Pages of a telephone directory. Try to determine what each doctor treats by examining the prefixes, roots, and suffixes of the specialty names. If you are unable to guess the meaning of some specialty names, look them up in a dictionary.

Specialty:	This specialist treats:
Obstetrics	_____
Gynecology	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

2. Medical Jargon

Familiar words take on new meanings in the jargon of certain professions. Some of these words can be found in the article about Sharon and Karan Baucom. Try to discover the special meanings the following words have within the medical profession from the context of the article:

Word:	Meaning:
resident	_____
Ob-Gyn	_____
rotation	_____
delivery	_____
call room	_____



IDEAS FOR WRITING

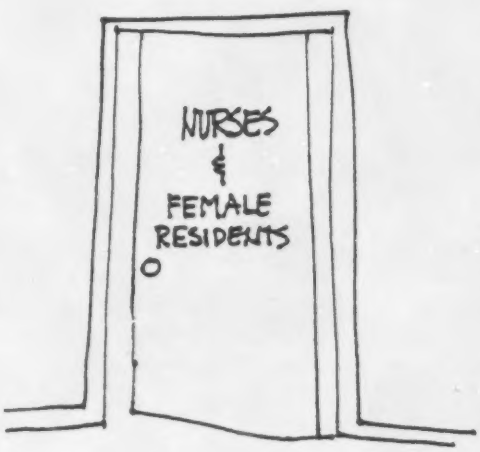
1. Write a comparison of Karan and Sharon Baucom's attitudes toward one of these subjects: Medical Specialties, Babies, Male Patients, or Families.

2. "You can't separate . . . mental attitude from . . . physical health," according to Sharon. Do you agree? Write a reaction paper, including an example from your own experience, if possible, to illustrate what you think.

3. Sharon is enthused about her career because "family medicine is a cross between many specialties." Write a description of family practice as she views it.

4. After reading about Karan and Sharon's medical specialties, which one would you choose and why? Write a paper expressing your opinions and reasons.

5. The article you read was written in 1976. Write an updated article about Karan and Sharon at the present time, using your imagination to fill in the details of their personal and professional lives.



IDEAS FOR PROJECTS

1. Karan believes that we do not know our own bodies as well as we should. Find out more about your basic bone structure by locating the necessary information and drawing an accurate human skeleton, labeling the parts.

2. Design an experiment to learn more about your own physical condition:

   a. Record your pulse rate regularly for a few days, after various kinds of activity.

   OR

   b. Using an inexpensive stethoscope, find all the sounds you can in your body.

   OR

   c. Record your blood pressure regularly for a few days using an inexpensive self-monitoring device.

3. Collect information on a medical subject which particularly interests you. Make an illustrated booklet including your own sketches and/or pictures clipped from magazines to help others better understand the subject.

4. Investigate body awareness exercises and learn how to do several to teach your classmates: yoga, meditation, biofeedback, visualization, relaxation, stretching, etc.

5. Start a yoga exploratory group with others who are interested. Read a book each and discuss it together. Interview a yoga instructor.

Invite a health career person (e.g., nurse, EKG technician, or optician) to class to demonstrate body organs and the medical instruments and types of evidence which are used in diagnosis or treatment of the organs. For example, an X-ray technician might show to students a kidney and X-rays of it and relate what can be learned from them. See COMETS Science's Healing Techniques, Fit N' Trim, Bones and Balance, and Body Detectives for further directions about classroom activities which physicians and other health career people can do with students.

COMETS: PROFILE

JAN ARMSTRONG:
Curator
of Zoo Education

COMETS

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Career Oriented Modules
to Explore Topics in Science

THE UNIVERSITY OF KANSAS
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Jan Armstrong

by JoBeth Allen

The Kumodo dragon had been slain. The giant lizard had not been killed by a gallant knight brandishing a sword, but by a tiny amoeba causing an infection. The exotic animals had been a gift to the American government from the Indonesion government. Zoo personnel were most concerned with finding the cause of death so that they could save the lizard's mate. The tissue of the deceased dragon was analyzed at a local hospital, where it was determined that she had died from an amoeba infection. A state department consultant who specialized in parasitology worked quickly to determine treatment that would not kill the remaining Kumodo dragon in the process. He tested animals closely related to the lizard and found an effective treatment by early the next day. Once again the Kumodo dragon was well to stalk the wilds of the Washington, D. C. National Zoo.

In the course of this drama, a young woman's life was changed. Jan Armstrong was a medical technologist in the hospital where the tissue was analyzed; she became so intrigued by the case that she asked to assist. As she collected samples at the zoo, Jan became acquainted with the zoo veterinarian, who eventually hired her. Her background in medicine and her lifelong interest in animals made her a natural candidate for the position of medical technologist at the zoo.

Jan recalls her early involvement with animals: "As I was growing up, animals were always my favorite interest. My parents tell me that I played with cats and dogs instead of dolls. I even dressed them up! My parents always encouraged this interest. I remember the time they arranged to keep a setting hen so we could see how chickens hatched. We always had dogs, cats, even a rabbit, in spite of the fact that we lived in the city."

Her interest in animals continued through high school, where Jan found science to be her favorite subject. As she thought more and more about choosing a career, she knew that animals and science could somehow guide her choice. Interestingly, it was finally a book that focused those interests. "I didn't think I wanted to teach, and I didn't know a lot about other options. Then I read a book - Arrowsmith by Sinclair Lewis. It introduced me to the field of bacteriology. The study of how bacteria affect people and animals, how they can spread, and what scientists can do to control them fascinated me. Career possibilities were excellent. I found out about laboratory research, hospital work, even industrial applications."

Ms. Armstrong explains why she did not pursue what seemed like an obvious choice: veterinary medicine. "At that time, I didn't think I could ever hurt an animal, even for the benefit of my own education, or for scientific advancement. I knew that veterinary courses would involve killing animals. In fact, in college I never took anatomy because it involved dissecting a cat. I just couldn't do it." Eventually, Jan overcame these feelings. "There are times when I have to kill one animal for the benefit of another, like when I feed mice to the kookaburra. There are also times when I have to hurt an animal to help it get well, such as when I give injections. Sometimes these things still bother me, but I do them because they are necessary."

In addition to her degree in bacteriology, Ms. Armstrong is a licensed medical technologist. With all this training, her first job was in a pineapple cannery! She was living in Hawaii and worked in the quality control laboratory. It was after moving back to the mainland that she eventually became involved with the Washington, D. C. National Zoo. Her original position at the zoo involved many quarantined animals; some of these were babies that were not cared for by their parents. This experience led to her current position with the Kansas City Zoo, where she is curator of zoo education. The position involves the education of the public about the zoo animals.

Jan describes her philosophy of rearing baby animals: "While it is important not to treat animals like humans, many of their needs are the same. Some of the babies are diapered, not because it's "cute," but because it is much simpler for the caretakers. We often provide toys for young animals, because in their natural habitats they are very playful. It is important for them to explore, to learn. But it is especially important with baby animals to look for signs of nonverbal communication, such as changes in activity or feeding patterns. However, with all the similarities to human babies, these animals are unique. It is essential to understand the growth patterns and capabilities of each species in order to raise them well." Ms. Armstrong illustrates this point by describing newborn cats versus primates. "Cats will be walking around by six weeks, and they become independent very early. A gorilla needs intensive care much longer."

With years of zoo experience, Jan Armstrong has formed definite opinions about many of the animals. Gorillas are her favorite. "To me, they are the aristocrats. They are intelligent, dignified, and they don't show off like the chimpanzees. The chimps are very emotional, and potentially dangerous although they are very interesting to work with." Jan has raised several baby gorillas, and there is a close bond between her and the animals. "The first gorilla I reared is now thirteen, living in another zoo. I haven't seen her often since she left us at fifteen months, but she still remembers me. Isn't that fantastic?" Polar bears, too, remember the person who rears them. They are not as easy to raise, however. "They require a lot of attention, because they are very rotten, noisy babies. I have raised more baby polar bears, including a set of twins, than anyone I know of;

it isn't easy. They yell a lot, and they'll bite at the drop of a hat. They are delicate little creatures, not at all nice, but very appealing in their own way."

Ms. Armstrong has worked with many different kinds of zoo babies. Her menagerie has included hoofed animals, a large variety of cats, all the great apes and other kinds of monkeys, several kinds of birds, polar bears, hyenas, and other small mammals. A baby is removed from its mother if the mother seems unwilling or unable to care for it, if the baby becomes ill, or if there is a high risk of infection. The risk factor is greater for some babies because of exposure to people. People who are allowed to handle the babies are carefully screened to bar those with colds or other communicable diseases. Baby animals, with few immunities, can become critically ill in a very brief time.

In addition to educating baby animals on how to grow up as healthy members of their species, Jan Armstrong educates people about animals. One of the topics most frequently discussed has to do with the humaneness of keeping wild animals in captivity. Armstrong presents some interesting facts. "When an animal fails to survive in a zoo, everyone knows about it because there are so few of them. However, mortality rates in the wild are fantastically high. Sea lions have a mortality rate of 80% in the first year; giraffes have a 75% mortality rate in the first six months. The mortality rate for robins is 90%, and for crocodiles, as high as 98%." These figures may comfort those who worry about the life expectancies of zoo animals. What about people who argue that it is unnatural and inhumane for animals to live in captivity? "Joy Adamson did a lot to make money for wildlife with her books, but that Born Free - Living Free bit was very detrimental to zoos. She and others who think we should let all the animals in the zoo return to the wilds miss an important point. Animals don't think the way we do. A lion doesn't think, 'Well, I'm going to watch the sun set tonight' or 'I think I will stroll down to the plains.' His life is survival. Besides feeding himself and rearing his family, about all a lion does is sleep, usually twenty hours a day. We do give our cats things to do, but most of the time they are quite content to just sleep."

Somehow, knowing Jan Armstrong gives one the feeling that the animals in her care are receiving the very best that both science and nurture have to offer.

CONTENT QUIZ

One of the abilities of good readers is interpreting what they read. The following questions deal with five areas of interpretation. Answer the questions, then compare your interpretation with a friend's. Ask for a third opinion (perhaps the teacher's) if the two of you do not agree.

1. Comparisons - deciding how ideas are the same, different, related or opposed.

   a. How do infant lions and monkeys differ in their behavior?

   b. In what ways are Jan Armstrong's job and that of a veterinarian the same?

2. Implications - arriving at an idea which depends upon evidence in the reading passage.

   a. Why do the zoo personnel give lions things to "play" with?

   b. How could Joy Adamson's writing make people dislike zoos?

3. Inductive thinking - applying a generalization to a group of observed facts.

   a. Why does Armstrong quote the mortality rate of several animals in the wild?

   b. How would you describe Jan's parents' philosophy of education?

4. Quantitative thinking - using a number of facts to reach a conclusion.

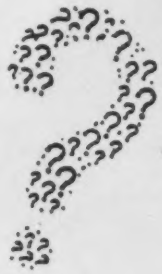
   a. Why might crocodiles have such a high mortality rate?

   b. What reasons does Armstrong give for taking a newborn away from its natural parents?

5. Cause and effect - recognizing the events leading to a happening.

   a. How did the death of the Kumoto dragon affect Jan Armstrong's career?

   b. Why didn't Jan choose veterinary medicine as a career?



WORDS TO KNOW

1. Some vocabulary development comes about when we learn what pairs of words mean. The five pairs of words in this exercise often occur in medical or scientific writing. Determine the meanings of these pairs; then use a thesaurus to find good synonyms for each word. Create a new pair that means basically the same thing as the original.

   a. communicable disease _____ _____

   b. life expectancies _____ _____

   c. mortality rate _____ _____

   d. natural habitats _____ _____

   e. nonverbal communication _____ _____

2. Here are some <u>uncommon</u> pairs of words. After looking up the meanings of any individual words you do not know, write sentences using these unusual pairs. The two words do not necessarily have to be used together, as long as they are both correctly used in the sentence.

   a. kookaburra brandishing

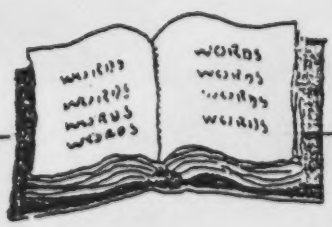
   b. exotic primates

   c. menagerie intrigued

   d. devious aristocrats

   e. detrimental parasitology

   f. humane immunities



IDEAS FOR WRITING

1. Functional writing is primarily intended for practical purposes such as communicating facts, describing, explaining and reporting. Choose one or more of the following suggestions for developing your functional writing skills.

   a. Write a letter of application to the zoo nearest you. Explain that you are looking for a part-time job, and give your qualifications.

   b. Describe in detail a favorite pet.

   c. Write a report on polar bears.

   d. Write a letter to your parents from your summer camp, which has focused on exploring nature.

2. Creative writing involves artistic self-expression. While almost any functional writing can also be creative, there are some categories usually associated with creative writing. Try your hand at one or more of the following suggestions.

   a. Write a short, humorous story about twin polar bear cubs.

   b. Write a mystery story using the title "Murder in (Zoo) Cell #9."

   c. Write a cinquain about any animal, using the following formula.

      Line 1: one word (name the animal)
      Line 2: two words (describe, using adjectives)
      Line 3: three words (express an action)
      Line 4: four words (express a feeling)
      Line 5: one word (synonym for Line 1)

      example: Deer
      Shy, graceful
      Darting, leaping, running
      Proud of her fawns
      Doe

IDEAS FOR PROJECTS

1. Class project. Plan a class field trip to a zoo in your vicinity. Correspond with someone at the zoo who has a position similar to Jan Armstrong's. Let this person know that your class is interested in an "inside" look at their animal kingdom. Try to arrange for all the students to follow different zoo personnel through a typical day, learning as much as possible about that person's duties, as well as the different animals. Some students may rather be assigned to one animal for the day, observing and recording data such as diet, activities, response to people, interaction with other animals, and disposition.

2. Small group project. This group should be formed only of people who love animals. Brainstorm about possible occupations for animal lovers, either for people who like animals in general or those who have a particular favorite, such as horses. Assign each group member to investigate several occupations, and construct a chart of pro's and con's for each job. Possible criteria for analysis include salary, training, travel (opportunities or necessities), danger, excitement, and unusual qualifications.

3. Individual project. Choose one of the following:

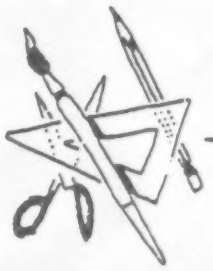
   a. Using clay or paper mache, model several zoo animals to display in your classroom. Have a tape recorder near the display; make a tape providing information about each animal.

   b. Round up a collection of animal songs, such as "Kookaburra," "Born Free," "Baby Elephant Walk," and "Sneaky Snake." Have these records at a listening center, or be really creative and put together a slide show from your zoo trip with these songs as background music.

   c. Construct a collage of wild animal pictures for the class or school bulletin board.

   d. Construct a toothpick or popsicle zoo, complete with cages, exercise grounds and animal houses. Maybe someone who chose (a) would like to add some animals.

Collect bones from a chicken and compare its bones with human bones. For example, what human bones match the chicken's wishbone? Invite a veterinarian, physical therapist, chiropractor, or other health career person to class to help with this activity. See COMETS Science's Bones and Balance for futher directions.



Bibliography of Biographies

ANTHROPOLOGY

MARGARET MEAD:

Mead, Margaret. Blackberry Winter. Morrow, 1972. (9+)
This autobiography of Mead (1901 - 1978) gives a very personal account of her life up to W.W. II. Mead writes very candidly of her professional and personal experiences and the effect they had on her as a woman. Recommended only for better readers.

Morse, Ann and Charles. Margaret Mead. Creative Education Society, 1974. (4-8)
Margaret Mead was an anthropologist and author who was one of the first professionals to actually live among primitive cultures and learn their languages and ways of life. She lectured and wrote on subjects such as tribes in New Guinea, American Indians, world population, peace, family relationships, racial tensions, and careers for women. The book provides an excellent explanation of anthropology in easy to understand terms and also gives a warm, descriptive, and full account of Mead's life. Illustrated with pictures.

ASTRONOMY

MARIA MITCHELL:

Baker, Rachel and Mitchell, Joanna B. America's First Woman Astronomer: Maria Mitchell. Messner, 1960. (5+)
Maria Mitchell (1818 - 1889) discovered a new comet which was named after her and for which the King of Denmark awarded her a gold medal. Until 1943 she was the only woman to have been elected to the American Academy of Arts and Sciences. This excellent book is written in a warm, informal, fictional manner. It does not use technical terms and would be of interest to casual readers as well as students of science.

VALENTINA TERESCHKOVA:

Sharpe, Mitchell R. "It is I, Sea Gull": Valentia Tereshkova, First Woman in Space. Crowell, 1975. (7+)
Valentina Tereshkova (1937 -), a Soviet Cosmonaut, was the first woman in space. In preparation for her historic flight she underwent arduous technical and physical training. She is now an aerospace engineer in the Soviet space program. This biography gives a good account of the life of Tereshkova. Since it is rather scientific and space-orientated, it might not appeal to the general reader.

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*Prepared by Carolyn Derusseau.

AVIATION

JACQUELINE AURIOL:

Auriol, Jacqueline. I Live to Fly. Dutton, 1970. (7+)
Jacqueline Auriol began flying as a hobby. A near fatal crash crushed her face; only the desire to become a professional pilot kept her from despair. She became a test pilot and has set many world's women's flying speed records. This first person narrative is a very moving, fascinating story of a courageous woman. Illustrated with photographs.

JACQUELINE COCHRAN:

Fisher, Marquita O. Jacqueline Cochran: First Lady of Flight. Garrard, 1973. (3-5)
Jacqueline Cochran (1912 -) had an impoverished childhood with almost no schooling; she worked in the cotton mills. As an adult she became interested in the cosmetic industry and in flying. She was twice named "Woman of the Year in Business" and was the first woman to break the sound barrier. This biography is warm, dramatic, and easy to read. Illustrated with pictures.

AMELIA EARHART:

Davis, Burke. Amelia Earhart. Putnam's, 1972. (6+)
Amelia Earhart (1898 - 1937) was the first woman to fly the Atlantic Ocean alone and the first person to fly solo between Hawaii and California. In 1937 she attempted a flight around the world, but her plane was lost in the Pacific and never found. This biography gives a substantial account of the adult motives, goals, and achi evements of Earhart and is movingly and dramatically written.

CHEMISTRY/HOME ECONOMICS/ECOLOGY

ELLEN RICHARDS:

Douty, Esther. America's First Woman Chemist: Ellen Richards. Messner, 1961. (7+)
Ellen Swallow Richards (1842 - 1911) was the first woman to graduate with a degree in chemistry from the Massachusetts Institute of Technology. She was not charged tuition to go to school so that no woman would officially be recorded as a student. She was an expert in nutrition and helped develop the profession of home economics; and she also was a founder of the new science of ecology. This outstanding book gives a warm, personal account of Richard's life. It is not technical and would appeal to all readers.

ETHOLOGY

JANE GOODALL:

Coerr, Eleanor. Jane Goodall. Putnam's, 1976. (5+)
Even as a young child, Jane Goodall was fascinated with animals and knew she wanted to be a scientist. During several summers she set up a backyard museum to raise money for old horses. As an adult she studied chimpanzees in the jungles of Africa. She gave the chimps names such as Mr. McGregor, Flo, Olley and Fifi, and loved them as friends. This book is beautifully illustrated and interestingly written. It is especially appropriate for younger readers.

HELEN PERLEY:

Johnson, Eleanor. Mrs. Perley's People. Westminister, 1970. (5-9)
Helen Perley's scientific curiosity began at an early age. Her observations about animals are widely known and respected. Mrs. Perley has an animal farm where she raises and cares for many kinds of animals. She says the animals are her friends and have feelings, needs, wants, and desires just as humans do. She has a family of stuffed bears in her living room, and every animal on her farm has a name and its own cage. This is a fast moving, easy to read, narrative biography and is illustrated with photographs.

GEOLOGY

MARY ANNING:

Blair, Ruth Van Ness. Mary's Monster. Coward, 1975. (3-7)
Mary Anning (1799-1843) was not formally schooled in geology or science; but because of her serious and persistent pursuit of the study of fossils, she is recognized as an authority in this area. The book gives a fascinating, historically sound, though highly fictionalized account of Mary's search for fossils in the cliffs around her seaside home.

MEDICINE

ELIZABETH BLACKWELL:

Baker, Rachel. First Woman Doctor: Story of Elizabeth Blackwell, M.D. Messner, 1944. (6+)
Blackwell (1821 - 1910) was the first woman in America to receive a medical degree. During the Civil War, she and her younger sister, Dr. Emily Blackwell, helped select and train nurses. Blackwell was a pioneer in preventive medicine, sanitation, and public health. This excellent biography is well-written and should be fascinating to all readers.

DOROTHEA DIX:

Baker, Rachel. Angel of Mercy: Story of Dorothea Lynde Dix. Messner, 1955. (6+)

Dorothea Dix (1802 - 1887) was a reformer and crusader for the mentally ill. She was responsible for the founding of 32 state mental hospitals. During the Civil War she was appointed superintendent of the U.S. Army nurses. This book is convincingly fictionalized and yet accurate and informative. It gives an outstanding, stirring, informal biography of Dix.

EMILY DUNNING BARRINGER:

Noble, Iris. First Woman Ambulance Surgeon. Messner, 1962. (6-10)

Emily Dunning Barringer (1876 - 1961) was the first American woman ambulance surgeon. She lived in a time when women physicians were few in number and often harrassed by male staff members. She was denied appointments to hospitals even though she graduated second in her class, but she refused to be discouraged. This biography is exciting and inspiring. It discusses Barringer's life from childhood through her internship at New York's Bellevue Hospital. It also explores the sex role sterotypes and prejudices that confronted her.

CONNIE GUION:

Champion, Nardi and Stanton, Rosamond. Look to this Day: The Lively Education of a Great Woman Doctor, Connie Guion, M.D. Little, 1965. (7+)

Connie Guion, M.D. was a remarkable woman whose career was marked by many "firsts" for women. She was a very warm person with many diverse interests; and she has been regarded as the modern dean of women doctors. The reader relives many of Guion's childhood experiences such as the birth of a younger sister, the dare to jump into a manure pile, and the run away mule, as well as experiencing the excitement of her very successful career. This biography is extremely well written and the many humorous anecdotes which Guion shared with the authors make it a most enjoyable reading experience.

ALICE HAMILTON:

Grant, Madeline. Alice Hamilton: Pioneer Doctor in Industrial Medicine. Abelard - Schuman, 1967. (7+)

Alice Hamilton (1869 - 1970) was the first woman appointed to the faculty of the Harvard Medical School and a crusader against many social injustices. She investigated lead factories and found that thousands of workers were being continually poisoned. This book gives an excellent narrative description of Hamilton and the society in which she lived. Illustrated with photographs.

ESTHER POHL LOVEJOY:

Burt, Olive W. Physician to the World: Esther Pohl Lovejoy. Messner, 1973. (7+)

Esther Lovejoy (1870 - 1967) was the first woman graduate of the University of Oregon Medical School. She made a wide variety of contributions through her medical profession such as Red Cross work, improving community medical and sanitary conditions, and developing orphanages, clinics and hospitals for disaster victims in Europe and Asia. This biography lacks distinctive literary style, but does give a dramatic, vivid account of Lovejoy.

MARIE ZAKREWSKA:

Victor, Agnes. A Woman's Quest: The Life of Marie E. Zakrewska, M.D. Appleton, 1974. (7+)

Marie Zakrewska (Zak-shef'ska) (1829 - 1902) was a Polish-German American who created several women's hospitals in New England. She was a great influence on women and a leader of women physicians. Part of this book is an autobiography which Zakrewska wrote to "encourage the average woman to determine and decide for herself to do whatever she can." She felt she had made great accomplishments through self-confidence, not through genius. This book is appropriate only for the best readers, but is a delightful reading experience.

NURSING

CLARA BARTON:

Nolar Jeannette C. The Story of Clara Barton of the Red Cross. Messner, 1941. (6+)

Clara Barton (1821 - 1912) was best known as the founder of the American Red Cross. She started teaching school at the age of 18 and always was active as a humanitarian and leader of women's rights. During the Civil War she helped the injured, even in the line of fire. This biography is warm and interesting and gives a complete portrait of Barton and the society in which she lived.

MARY ANN BICKERDYKE:

deLeeuw Adele. Civil War Nurse, Mary Ann Bickerdyke. Messner, 1973. (6+)

Bickerdyke (1817 - 1901) was a nurse who distinguished herself during the Civil War by her sympathetic and excellent care of the wounded. After the war she was well known for her social welfare work, first in Kansas and later in New York and California. Bickerdyke was an assertive, energetic and determined woman. Temperance was one of Bickerdyke's strongest beliefs. Once in Lawrence, Kansas, she came across a man who was trying to get a signature for a saloon license. Instead of signing it, she grabbed and burned it. This is a fast moving, easy to read, narrative biography.

EDITH CAVELL:

Grey, Elizabeth. Friend Within the Gates: The Story of Edith Cavell. Houghton Mifflin, 1961. (5-9)

Edith Cavell (1865 - 1915) was an English born nurse and a spy during W.W.I. She was the head of a hospital in Belgium during the War and aided the escape of hundreds of Allied soldiers. Eventually her activities were detected by the Germans and she was sentenced to death by a firing squad. She was considered to be a martyr by her English contemporaries. This biography is very well written and gives an excellent account of both her early years as a nurse and her efforts as a war spy.

FRANCIS DAVIS:

Pitrone, Jean. Trailblazer: First Negro Nurse in the American Red Cross. Harcourt, 1969. (6+)

Francis Davis (1882 - 1964) was the first black nurse to be officially enrolled in the American Red Cross. Her mother died when she was five and she lived with various foster families. Finally one family befriended her and helped her gain an education. The book is informally written and gives a stirring and complete account of Davis' life. The author also presents a vivid picture of prejudice against blacks.

ALICE FITZGERALD:

Noble, Iris. Nurse Around the World: Alice Fitzgerald. Messner, 1964. (7+)

Alice Fitzgerald (1874 - 1962) was a nurse who received honors, decorations, and medals from many countries. She worked until the age of 74. This book is dramatic and inspiring and gives a good profile of the early days of the nursing profession as well as of Fitzgerald. It is very readable and interesting.

FLORENCE NIGHTINGALE:

Hume, Ruth. Florence Nightingale. Random House, 1960. (6-10)

Florence Nightingale (1820 - 1910) was a nurse, reformer, and organizer. She came from a wealthy, British family and dared to enter the nursing profession, which usually recruited from the lowest and most disreputable classes. During the Crimean War she organized and supervised nurses at the front. Her leadership reduced the death rate from 430 to 22 per 1,000. This biography gives a very fine, inspiring portrait of Nightingale and also thoughtfully examines the society in which she lived.

LINDA RICHARDS:

Baker, Rachel. America's First Trained Nurse: Linda Richards. Messner, 1962. (7+)

Linda Richards (1841 - 1930) was the first nurse to receive a diploma in the United States. She conferred with Florence Nightingale and studied her methods of training nurses. She opened the first nursing school in Japan and worked hard to raise the standard of nursing care in the U.S. This fine narrative biography is directed to all readers, not just those interested in the career of nursing. It gives a warm, dramatic portrait of Richards and also covers the history of nursing in the late nineteenth and twentieth centuries.

LILLIAN WALD:

Bloc, Irwin. Neighbor to the World: The Story of Lillian Wald. Crowell, 1969. (6-9)

Lillian Wald began her varied and distinguished career as a public health nurse by helping the immigrants who settled on New York's Lower East Side around the turn of the century. Eventually she established a world-famous settlement house, an ethnic theater, the first playground, and the first school health program. This book effectively portrays Wald as a compassionate, dedicated, and energetic woman and is written in a clear, interesting style.

OCCUPATIONAL THERAPY

ORA RUGGLES:

Carlova, John. The Healing Heart. Messner, 1961. (7+)

Ora Ruggles was a pioneer in the healing science of occupational therapy. She was born in 1894 in western Nebraska and was a tomboy; if a rifle or a bridle wasn't in her hands, then a baseball was. She preferred to dress-up a one-eyed barn cat in clothes instead of the beautiful dolls her mother would give her. During W.W.I Ruggles helped innumerable amputees learn new occupations and feel useful again. The book is written in a fascinating, narrative style and gives a very complete and interesting account of Ruggles' life. It is most appropriate for better readers.

OCEANOGRAPHY

RACHEL CARSON:

Sterling, Phillip. Sea and Earth: The Life of Rachel Carson. Crowell, 1970. (5+)

Rachel Carson (1907 - 1964) was a marine biologist, conservationist, and author. She felt that "man, making nature ugly for the best reasons or the worst, was making his own life ugly." Rachel was a warm, confident person who never needed other's approval. She always liked to write and had a story published in a magazine at age ten. During W.W.I she wrote pamphlets for the U.S. government to help increase the popularity of eating fish, since meat was scarce at home. In 1962 she wrote Silent Spring, which warned of the danger of insecticides. This biography is very well written and gives a full account of Carson's early childhood, family life, school, Pennsylvania homeland, and the development of her concerns about preserving nature. All readers would enjoy this book.

EUGENIE CLARK:

Clark, Eugenie. Lady With A Spear. Harper, 1953. (8+)

This book is written in a most interesting, fast-moving style. Clark tells of her childhood, youth, and adult career experiences. It is illustrated with pictures of Clark, her fish subjects, and the people with whom she worked. The book should be especially fascinating to those interested in marine biology.

McGovern, Ann. Shark Lady, True Adventures of Eugenie Clark. Four Winds Press, 1978. (5+)

Eugenie Clark's (1922 -) interest in fish started at age nine as the result of weekly visits to an aquarium in New York City. She loved sharks and wanted to study them and swim with them. She developed a major marine laboratory in Florida, studied the sleeping sharks in the caves of Mexico, and took a baby pet shark to the Prince of Japan. She advises people to "get involved in what interests you the most." This book is very informative, fast moving, humorous, and easy to read.

SCIENTIFIC RESEARCH

IRENE JOLIOT-CURIE:

McKowan, Robin. She Lived For Science. Messner, 1961. (7+)

Irene Joliot-Curie (1897 - 1956) was the daughter of Marie and Pierre Curie and, like them, was a scientist. She, along with her husband, was the winner of the 1935 Nobel Prize in chemistry. She successfully combined the roles of scientist, wife, and mother during her productive life. Although somewhat technical, this book moves along quickly and gives a complete account of Joliot-Curie's personal and professional life.

MARIE CURIE:

de Leeuw, Adele. Marie Curie: Woman of Genius. Garrard, 1970. (4-7)
Marie Curie (1867 - 1934) was the scientist who discovered radium. Ironically, it was due to long exposure to the penetrating rays of radium that she died. She was the first woman to win the Nobel Prize in science and the first person to win it twice. She successfully combined a science career with marriage and motherhood. The book is well written and gives a good, clear portrait of Curie. Illustrated.

McKowan, Robin. Marie Curie. Putnam's, 1971. (4-8)
This book gives an excellent account of Curie's life. It is well written and portrays Curie in a warm, inspiring manner. Illustrated.

LISE MEITNER:

Crawford, Deborah. Lise Meitner, Atomic Pioneer. Crown, 1969. (7+)
Lise Meitner (1878 - 1968), a nuclear physicist, was shy and yet persistent and wanted to be like Marie Curie. She did not want to be "confined in the circle of kitchen, children and church." Her discoveries concerning uranium and thorium laid much of the groundwork for the atomic bomb. She felt scientists had a moral responsibility and was very unhappy about the uses made of her discovery. The book is somewhat technical but gives a very accurate, interesting account of Meitner's life as a female, Jewish scientist in the Nazi society during W.W.I.

FLORENCE SABIN:

Phelan, Mary Kay. Proving the Unknown: The Story of Dr. Florence Sabin. Crowell, 1969. (5-8)
Florence Sabin (1871 - 1953) was a very modest, humble, and unusually brilliant person. She was a physician, scientist, and researcher who specialized in the investigation of the lymphatic system, blood vessels, and the origin of red blood cells. She made a three-dimensional model of the brain which is still used in medical schools. Although the book becomes technical in parts, it is written in a clear, interesting manner and is highly recommended for all readers.

MAUDE SLYE:

Slye, McCoy. The Cancer Lady. Thomas Nelson Inc., 1977. (7+)
Dr. Maud Slye (1879 - 1954) was a scientist who dedicated 38 years of her life to cancer research. In her laboratory "only the mice are kings. All others are secondary," said Maud Slye. She found that the tendency of mice to be susceptible or resistant to cancer was hereditary. By selective breeding she eliminated many mouse diseases, thus enabling researchers to concentrate only on cancer. This book accurately and interestingly presents the story of cancer research and of the professional life of Slye.

COLLECTIVE

Bowman, Kathleen. New Women in Medicine, Children's Press, 1976. (5+)
Very brief, three to five page, biographies are presented for seven women in the medical field: Mary Calderone, Kathryn Nichol, Anna Elington, Mary Louis Robbins, Estelle Ramey, Margaret Hewitt, and Elizabeth Kubler -Ross. Interesting, easy to read, very personal biographies. Illustrated with photographs.

Emberlin, Diane. Contributions of Women: Science. Dillon, 1977. (7+)
This is an excellent book which explores the lives of six women scientists. It is very readable and gives accurate, vivid accounts of Annie Cannon, astronomer; Lillian Gilbreth, industrial engineer; Margaret Mead, anthropologist; Rachel Carson, marine biologist; Ruth Patrick, ecologist; and Eugenie Clark, icthyologist. The book is enhanced by many photographs.

Facklam, Margery. Wild Animals, Gentle Women. Harcourt, 1978. (7+)
This book is about eleven women who became animal watchers. Some are famous, others are little known. Some are trained scientists, others just happened into the study of animals. Some learned from animals in zoos, some in their own backyards, and others in oceans and jungles. All of these women are strong, patient, and capable and ask lots of questions about animals. The book is very well written and gives a warm, interesting, and often humorous account of the eleven women.

Fleming, Alice. Doctors in Petticoats. Lippincott, 1964. (5+)
This collective biography gives interesting, easy-to-read, narrative accounts of female doctors who lived in the late nineteenth and early twentieth centuries. Each short, approximately 20 page, biography gives a lively and fairly complete portrayal of the physician's life. Included in this book are biographies of Marie Zakrzewska, Emily Barringer, Clara Swain, Sara Jordan, and Connie Guion.

Gennett, Ann. Contributions of Women: Aviation. Dillon, 1975. (5-8)
This collective biography contains profiles of six famous female aviators: Amelia Earhart (1898-1937); Anne Morrow Lindbergh (1906-), navigator, pilot, and poet; Jacqueline Cochran (1912-), world record breaker of the jet age; Jerrie Mock (1925-), first woman to complete an around-the-world solo flight; Geraldine Cobb (1931-), first woman to pass the astronaut testing program; and Emily Howell (1939-), first female pilot for a U.S. scheduled airline. It is well organized, fascinating, and easy to read. Interesting anecdotes make for enjoyable reading. Illustrated with photographs.

Graham, Ada and Frank. Careers in Conservation. Scribner, 1980. (5+)
This collective biography is divided into two sections. The first gives a history of the American conservation movement; the second contains 13 profiles of conservationists who work in a wide variety of settings. Included in the book are profiles of four women: a game warden, an administrator for Central Park, a National Audubon Society representative, and a manager of a canyon in Arizona. The book is written in a fascinating manner and would be of interest to most readers.

Haber, Louis. Women Pioneers of Science. Harcourt, 1979. (6+)
This book contains biographies of twelve women in science. Special emphasis is given to current scientists and many scientific fields are represented. Profiles include, for example, those of Alice Hamilton, industrial medicine; Rachel Brown, biochemist; Dorothy Hodgkin, crystallographer; Jane Wright, physician and chemotherapist; and Rosalyn Yalow, nuclear physicist in medicine. The brief, narrative biographies present the highlights of each scientist's life.

Hirsch, Carol S. Guardians of Tomorrow: Pioneers in Ecology. Viking, 1971. (6+)
This book is extremely well written and thoughtfully organized. One chapter is on Rachel Carson's contributions to ecology. It is not a personal biography; the entire focus is on her work and writings. It does clearly reveal the extent of Carson's foresight, brilliance, and concern for the environment.

Hoyt, Mary Finch. American Women of the Space Age. Atheneum, 1966. (5-10)
This collective biography gives very brief accounts of the many women who are in the U.S. space program. A few of the women scientists in the book are Evelyn Anderson, an endocrinologist who works in space medicine; Alice Chatham, who helps develop space suits and helmets; Dorothy John, a mathematician; Julie Beaseley, an experimental psychologist; Merna Dawson, who analyzes fuels; and Mildred Mitchell, who works in the field of bionics. The book is illustrated and written in a non-technical, easy to read style.

Hume, Ruth. Great Women of Medicine. Random, 1964. (6-10)
The excellent, informal biographies found in this book are lively, readable, and accurate. They are further enhanced by photographs and old prints. Included are inspirational profiles of women who pioneered in the health fields: Florence Nightingale, nurse; Elizabeth Blackwell and Mary Putnam Jacobs, American physicians; Anderson and Jex-Blake, British physicians; and Curie, Nobel prize winning French scientist. There is also a chapter on more contemporary women.

Land, Barbara. The New Pioneers: Women in Antarctica. Dodd, Mead, 1981. (7+)
In Antarctica they've been snowed in at a remote camp, hauled equipment in subzero temperatures, looked for evidence of Gondwanaland, caught a falling star, and done much more. Land related the stories of over a dozen women who in the last decade have joined international teams of scientists to explore the last found continent. Students--both girls and boys--will be drawn into the exciting world of polar exploration while learning more about these adventurers as human individuals as well as career people.

McKowan, Robin. Heroic Nurses. Putnam, 1966. (5-9)
Nursing is as ancient as the human race. This is an unusually fine collection of profiles of nurses. It is well-documented, interesting to read, and would be valuable for all readers. Included in the book is a chapter on "nurses of time long past," plus profiles on 12 nurses, including Florence Nightingale, pioneer nurse; Mary Bickerdyke, Civil War nurse; Clara Barton, founder of the American Red Cross; Edith Cavell, nurse and spy; and Sister Elizabeth Kenny, polio nurse.

McLenighan, Valjean. Women and Science. Raintree, 1979. (6+)
Today there are more opportunities for American women in science than ever before, but the number of women scientists is still small. This book provides a brief look at six women and their careers in science. It is written in a concise, interesting, and easy-to-read manner. Among the six profiles are Annie Jump Cannon, an astronomer who identified and classified more stars than anyone else, and Alice Hamilton, a founder of industrial medicine. Others are Rachel Carson, Margaret Mead, Florence Sabin, and Chien Shung.

Noble, Iris. Contemporary Women Scientists of America. Messner, 1979. (7+)
This book focuses on twentieth century American women who have made great contributions in science. Included are Margaret Mead, anthropologist; Joanne Simpon, meteorologist; Dixie Lee Ray, marine biologist; Isabella Karle, crystallographer, and chapters on seven other twentieth century scientists. The profiles are well written, factually accurate, and complete. The style is easy to read and should be valuable for most readers.

Poole, Lynn and Gray. Scientists Who Work Outdoors. Dodd, 1963. (7+)
This very fine biography focuses on the professional careers of marine biologist, Dixie Lee Ray, and anthropologists, Margaret Mead and Betty Jane Meggers. It discusses their education and early training as well as some of their later accomplishments. It is highly readable and would be of particular value to those wishing to know more about the professions of the subjects.

Wright, Helen and Rapport, Samuel. Great Adventures in Nursing. Harper, 1960. (7+)
This fast moving and fascinating book explores many nursing adventures and is designed to interest readers who want to know more about nursing as well as those who just enjoy reading an exciting story. It is divided into three sections; Hospital Adventures, From the Jungle to the Slum, and Adventures in War.

Yost, Edna. Women of Modern Science. Dodd, 1959. (7+)
This is a collective biography of twelve women scientists. The author and publisher were concerned that in America so few women are encouraged to enter science-related careers. Therefore, this book was written with young women in mind and was intended to inspire the pursuit of scientific interests. Scientists included in this book are Helen Hogg, astronomer; Elizabeth Russell, zoologist-geneticist; Chien Schung Wu, nuclear physicist; Edith Quimby, physicist; Gladys Emerson, biochemist; and Dorothea Rudnick, embryologist. Good, brief sketches of interesting women scientists. Most appropriate for better readers.

GENERAL

Fenten, D.X. Ms - M.D. Westminister Press, 1974. (7-12)
This book is designed especially for young women interested in a medical career. It gives information about scholastic preparation, medical specialities, and challenges facing women in medicine. The book is both informative and entertaining and covers the subject of female physicians very thoroughly.

Goldreich, Glori and Esther. What Can She Be? An Architect (1974), What Can She Be? A Computer Scientist (1979), What Can She Be? A Film Producer (1972), What Can She Be? A Geologist (1976), and What Can She Be? A Veterinarian (1972), all from Lothrop. (1-5)

All these books are easy to read and filled with interesting pictures. Each follows the life of one woman and gives a good account of her professional and personal daily activities.

Hewett, Joan. Watching Them Grow. Inside a Zoo Nursery. Little, 1979. (5-10)

This book gives a behind the scenes view of the baby animal nursery at the San Diego Zoo. It covers approximately four months in the lives of Kalind, a pygmy chimpanzee; Loch and Lisa, orangutan twins; Dracula, a spider monkey; and A-Seven, an aardvark. The book is filled with photographs of the nursery attendants and animals as they go through the daily activities in the nursery. The book is very informative and fascinating. Its content and style make it appealing to almost any reader.

Jochnowetz, Carol. Careers in Medicine for the New Woman. Watts, 1978. (5-9)

This book discusses the qualities needed to become a physician and includes chapters on medical training, medical schools, specialities within medicine, and combining a practice with a family. It also has brief interviews with women in medicine throughout the book. The book is very factual and informative and yet is written in an interesting and easy to read style. Contains many photographs.